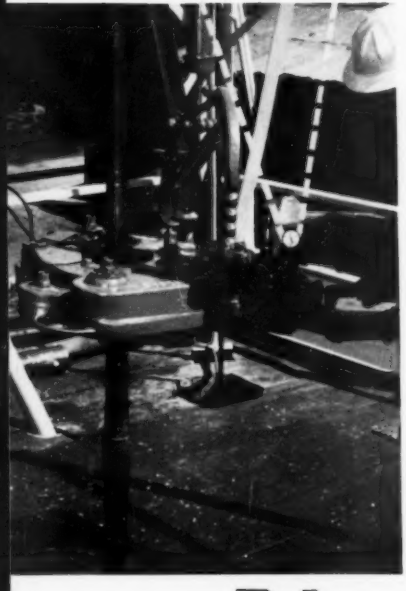
the OIL AND GAS JOURNAL

J's new and exclusive Torque Indicator ontrols the tightness of the tubing joints nd couplings. Gives identical make-up or each joint. Eliminates the costly down time" caused by guesswork.

NOW... BJ POWAIRMATIC TUBING TONG

keeps a 'controlling hand' on your tubing make-up



POSITIVE CONSISTENT MAKE-UP. Once again, BJ engineering offers an outstanding improvement to safeguard producing wells and eliminate costly workovers. The BJ POWAIRMATIC now provides a mechanical method of making up tubing joints uniformly. The operator controls the degree of make-up through adjustment of a pop-off valve. The adjustment is based on "Air Pressure vs Torque." This data is contained on a plaque which is conveniently located near the indicator dial. Each joint is made up identically, safe against leaks. Instant releasing of the jaws further insures tight joints and when combined with measured make-up — there is nothing better.

THERE'S NO CHANCE for error; no guessing as to how tight a joint may be. A string made up by a Torque-measuring POWAIRMATIC is set for long service life with minimum cost for production workover.

FAST... SAFE... The BJ POWAIRMATIC is thoroughly engineered to save equipment, save costly time, and improve safety standards. The most powerful tool of its type, the POWAIRMATIC gives you automatic ring positioning, two-speed operation, easy rollover hanger, quick interchange of jaws . . . AND NOW, positive control of make-up torque of the tubing joints. See for yourself how the *torque-indicating* method developed by BJ protects your wells by making-up every joint of your tubing to a standard. Jaws —now available to handle couplings on $1\frac{1}{4}$" through $2\frac{1}{2}$" tubing—either plain or upset. Easily installed to further guarantee a leakproof string. Ask your local BJ representative for a demonstration of the POWAIRMATIC Tubing Tong today.

Byron Jackson Co.
Since 1872

Main Office & Plant: Los Angeles 54, Calif.
Mid-Continent Office & Plant, Houston 1, Tex.
Export Office, New York 17, New York
Stocking Jobbers All Principal Oil Fields

BJ MEANS ENGINEERED OIL TOOLS

PRICE 50 CENTS
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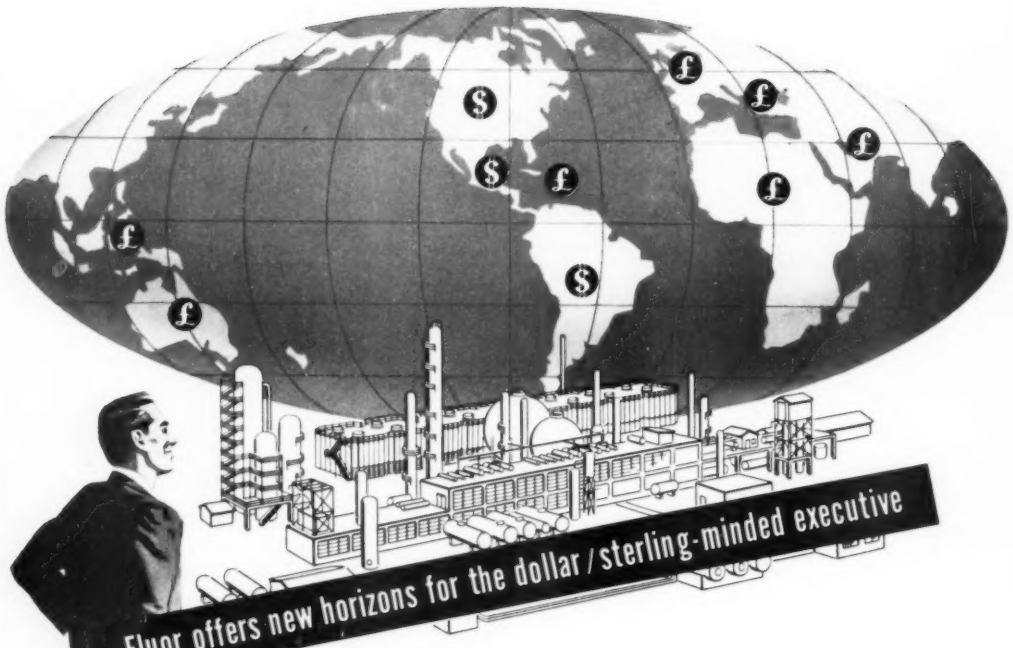


Fluor offers new horizons for the dollar / sterling-minded executive

TO FACILITATE the building of petroleum, chemical and auxiliary plants in the sterling and other areas, The Fluor Corporation, Ltd., is pleased to announce its association with Head Wrightson Processes Ltd., a British Engineering Organization, currently engaged in the engineering, supply and erection of units for Light Oil and Crude Oil Fractionation, Gas Separation, Solvent Extraction, Chemical Treating, Utilities Supply, Carbon Black Production, etc., within the British Commonwealth and other countries.

Unlimited Facilities... The agreement between The Fluor Corporation, Ltd., and Head Wrightson Processes Ltd. opens new fields for capital investment in the sterling and other areas by making available . . .

. . . Process design, engineering, purchasing, progressing, inspection, shipping and erection supervision of petroleum and chemical processing facilities throughout the world by the *combined* staffs of The Fluor Corporation, Ltd., in the United States and Head Wrightson Processes Ltd. in England.

. . . The manufacture and availability in the sterling area of Fluor-designed products including Cooling Towers, both atmospheric and mechanical draft; Fin-Fan Air-Cooled Heat Exchangers; Air-Cooled Mufflers; Pulsation Dampeners and Gas Cleaners.

All Fluor products fabricated by Head Wrightson Process Ltd. will be in strict accordance with Fluor design specifications and will bear the same performance guarantee afforded Fluor products manufactured in the United States. They will be marketed by Head Wrightson Processes Ltd. throughout the sterling area as Fluor products.

A Flexible Agreement... The agreement between The Fluor Corporation, Ltd., and Head Wrightson Processes Ltd., is of such flexibility as to offer the investor a free choice in determining the allocation of available currencies between various phases of a project and in arranging the localization of the engineering and fabrication in the best way to meet attendant circumstances. The most advantageous arrangements, varying from case to case, may be determined during the discussions preceding a contract.

Products and Services offered to the investor under the association between The Fluor Corporation, Ltd., and Head Wrightson Processes Ltd., are payable in some cases entirely in sterling or, in other cases, largely in sterling with a minimum of dollars involved.

FLUOR

BE SURE WITH FLUOR

Detailed information on how this association between The Fluor Corporation, Ltd., and Head Wrightson Processes Ltd. can benefit your particular dollar, sterling investment requirements will be gladly furnished upon request to either The Fluor Corporation, Ltd., Los Angeles, California, or Head Wrightson Processes Ltd., London, England.

Designers and Constructors of Refinery, Chemical and Natural Gas Processing Units. Manufacturers of Cooling Towers, Fin-Fan Units, Mufflers, Gas Cleaners and Pulsation Dampeners.

THE FLUOR CORPORATION, LTD. *Los Angeles 22* • NEW YORK • CHICAGO • BOSTON • PITTSBURGH • TULSA • HOUSTON • SAN FRANCISCO

HEAD WRIGHTSON PROCESSES LTD. TEESDALE HOUSE, BALTIC STREET, LONDON, E.C.1, ENGLAND

For Minimum Antioxidant Treating Costs

Check All 3

Du Pont Gasoline Antioxidants . . . Nos. 5, 6 and 22

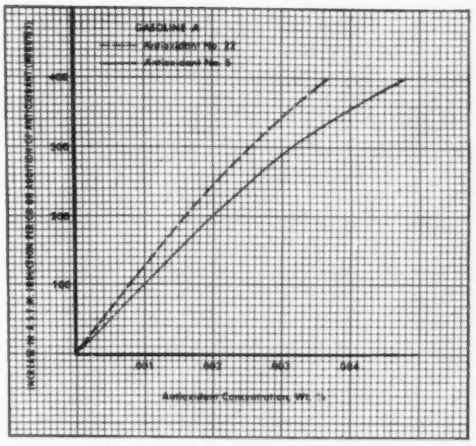
Frequently, there is considerable variation in the antioxidant response of gasolines. It is for this reason that Du Pont offers three gasoline antioxidants . . . Nos. 5, 6 and 22, from which the one best suited to your gasoline can be chosen.

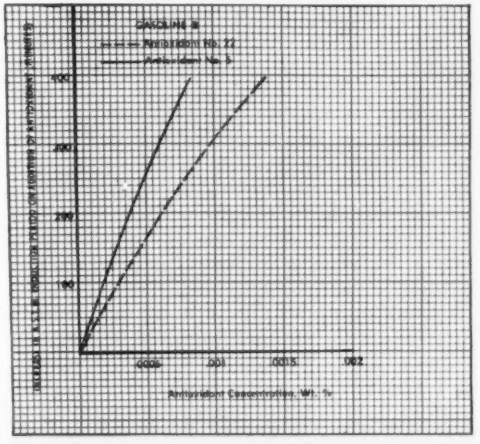
Variation in antioxidant response in two gasoline stocks is illustrated by the graphs at the right. These were taken from our laboratory files and show how in Gasoline "A" Antioxidant No. 22 showed a definite saving over Antioxidant No. 5, and in Gasoline "B" the response was reversed with No. 5, showing an advantage over No. 22. (No. 6 had approximately the same response as No. 5).

Where copper dish gum specification is of importance, it will usually be found that Antioxidant No. 6 provides the most economical control.

If water extraction by tank bottoms or in pipelines is a problem, Antioxidant No. 22, because of its low water solubility, may be the answer.

Let the nearest Du Pont District Laboratory evaluate your fuel and make the proper recommendations for minimum antioxidant treating costs. For samples and further information, ask your Du Pont Petroleum Chemicals representative or write the nearest District Office.





Note: The antioxidant concentration in these graphs is expressed as active ingredient for purpose of direct comparison.

Du Pont Antioxidant No. 5—is a solution containing 50% Normal-butyl-para-aminophenol, 30% Anhydrous Iso-propanol, and 20% Anhydrous methanol.

Du Pont Antioxidant No. 6—is a solution containing 50% Iso-butyl-para-aminophenol, 30% Anhydrous iso-propanol, and 20% Anhydrous methanol.

Du Pont Antioxidant No. 22—is a commercial grade of N:N' disecondary butyl-para-phenylene-diamine containing no solvents.

DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT
PETROLEUM CHEMICALS

E. I. DU PONT DE NEMOURS & CO., (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

District Offices: Wilmington, Del.; Chicago, Ill.; Tulsa, Okla.; Houston, Texas; Los Angeles, Calif.

District Laboratories: Wilmington, Del.; Chicago, Ill.; Tulsa, Okla., Houston, Texas; El Monte, Calif.

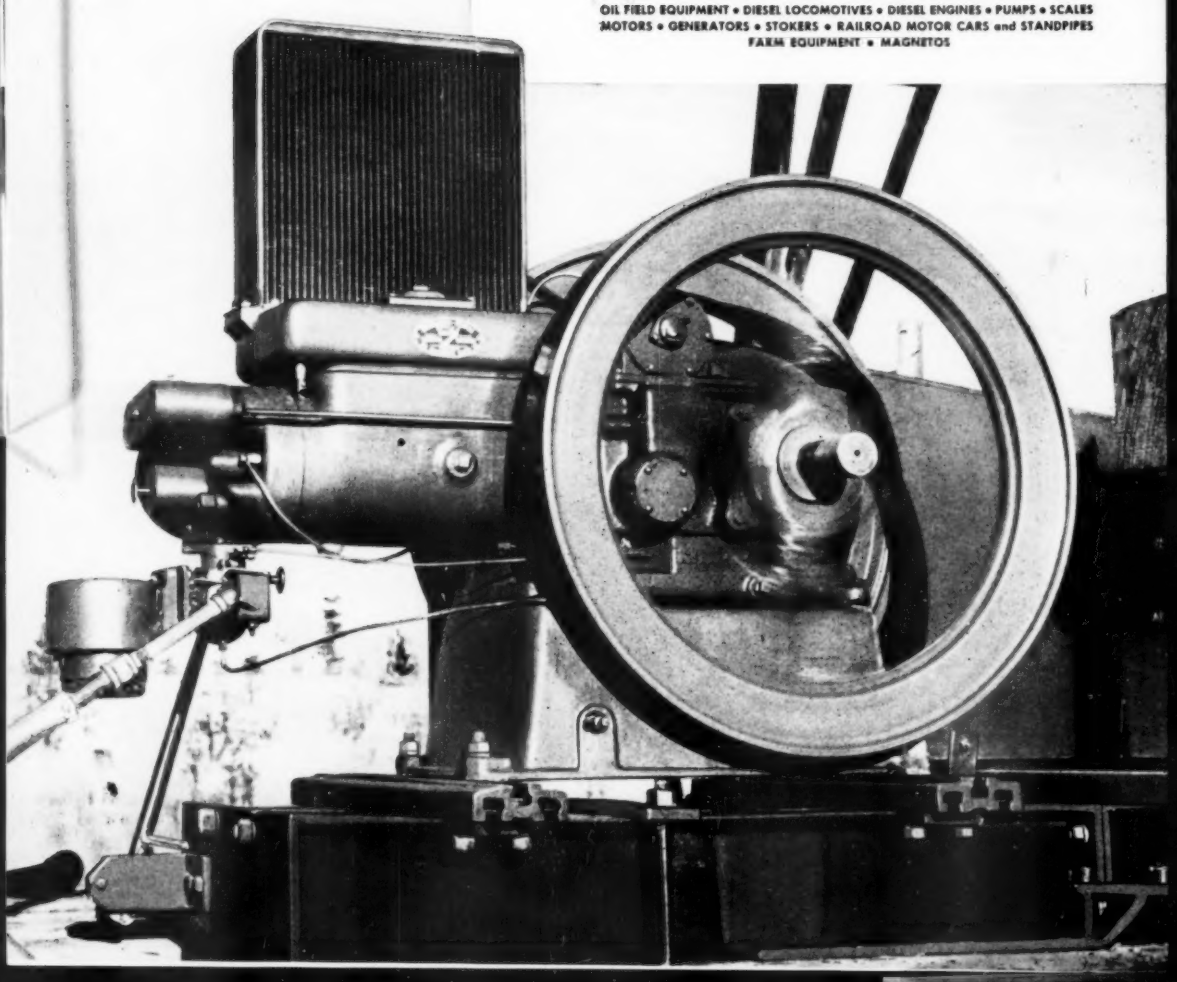
As easy as the "ZC"

● As easy-starting as the Fairbanks-Morse "ZC" Engine is an old oil field proverb. The proverbial easy starting of the "ZC" in any weather is one of the big reasons why they're the oil field favorites. The "ZC" is easy to maintain and operate . . . easy on the pocketbook, too! Trouble-free vapor cooling, self-oiling, extra heavy flywheels that assure smooth, power-saving operation are but a few of the many "ZC" features that assure better pumping service. Fairbanks, Morse & Co., Chicago 5, Ill.

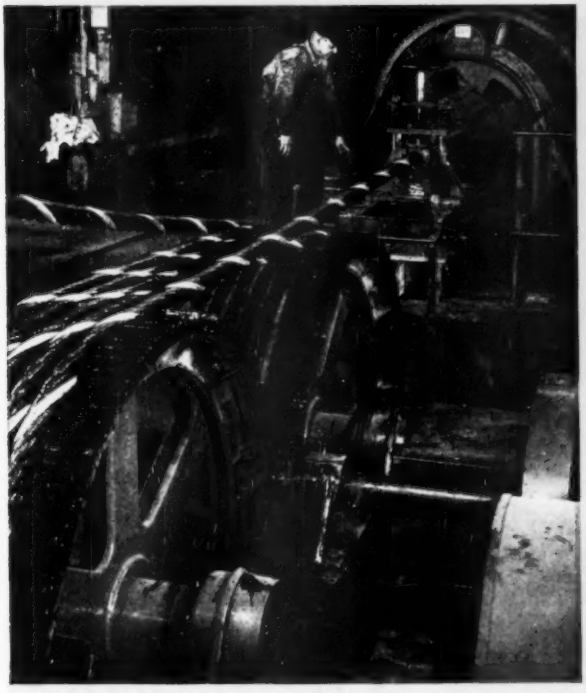
FAIRBANKS-MORSE

A name worth remembering

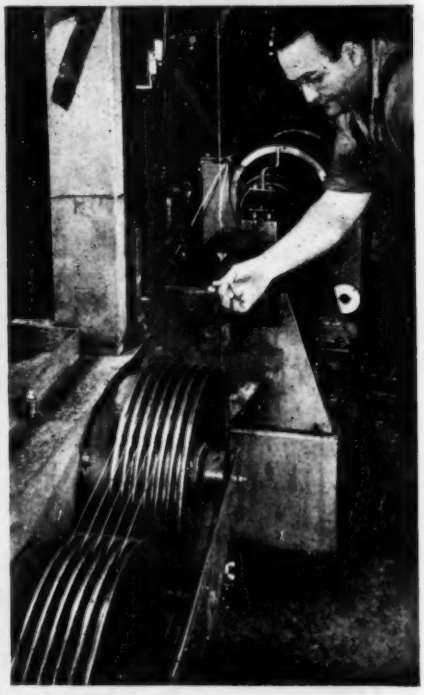
OIL FIELD EQUIPMENT • DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES
MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS and STANDPIPES
FARM EQUIPMENT • MAGNETOS



This photograph shows a 3⅛" diameter Monarch Whyte Strand Wire Rope coming off a Macwhyte closing machine. Weight of this rope is approximately 16.65 pounds per foot. It has a strength of approximately 392 tons and is used for the digging line on large dragline excavator with 35 cu. yd. bucket.



In this photograph is a 3/64" diameter Stainless Steel Cord coming off a Macwhyte closing machine. It weighs approximately 0.35 lbs. per 100 feet; has a strength of approximately 270 pounds, and is used for many small cord needs.



Whether you need

LARGE WIRE ROPE or SMALL WIRE CORD

make your selection from

You will get smoother operation and better service when you use the wire rope designed and manufactured to meet your requirements.

Macwhyte engineers are always glad to suggest the correct Macwhyte rope or cord best suited to your needs.

Just drop a card or letter to Macwhyte Company or your Macwhyte distributor.

MACWHYTE COMPANY

2916 Fourteenth Avenue **Kenosha, Wisconsin**

Manufacturers of Monarch Whyte Strand PREformed, Internally Lubricated Wire Rope, Atlas Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope.

Mill Depots: New York • Pittsburgh • Chicago
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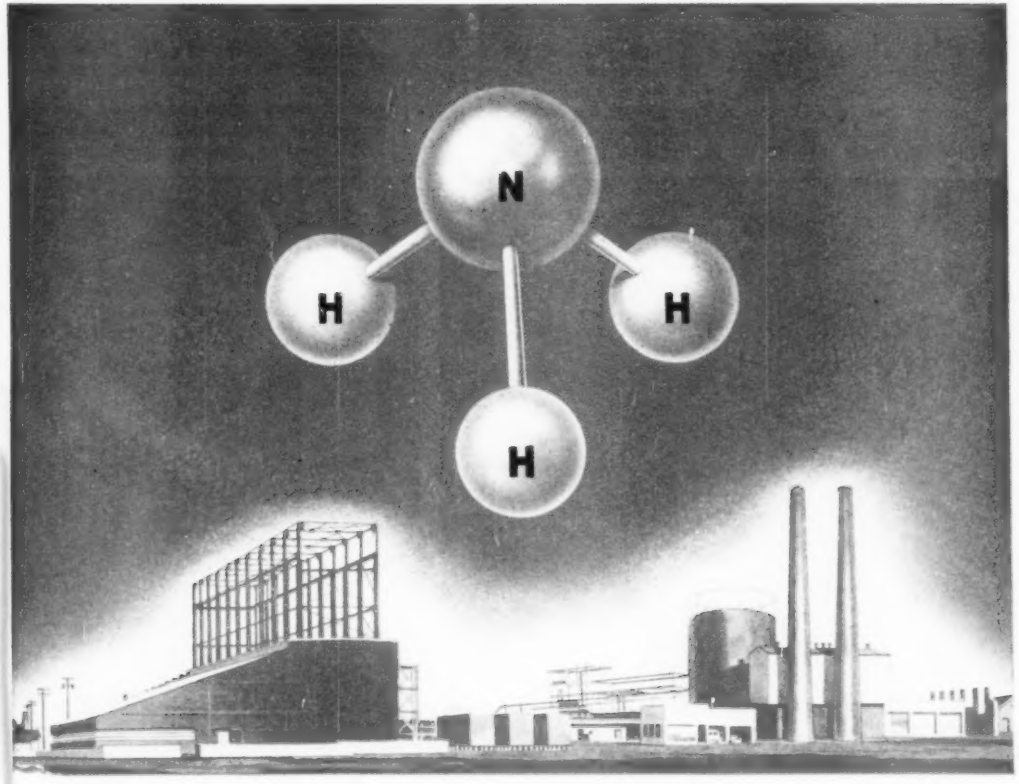
Catalog on request.

a thousand and one
WIRE ROPES
made by
MACWHYTE



THINKING OF MAKING *Synthetic Ammonia?*

3,953 tons per day! That's the total rated capacity of 44 synthetic ammonia installations completed or currently being constructed throughout the world by Chemico. Here are four major reasons why so many large producers of synthetic ammonia look to Chemico:

1. Chemico-built plants employ the well-known N. E. C. Process which can be adapted to use any available source of hydrogen, i.e. from electrolytic cells, semi-water gas from coke and natural gas as well as from coke oven gas, gas from lignite or by-product hydrogen from electrolytic chlorine cells or fermentation processes.
2. The gases for the production of ammonia are thoroughly purified before being introduced into the synthesis system. This accounts for the continuous service and long life of the catalyst . . . important factors in assuring low ammonia costs.
3. The temperature of the highly active, extremely rugged catalyst is kept at a constant optimum. This avoids overheating portions of the catalyst mass, with a consequent loss of activity.
4. Chemico plants are designed to operate at pressures high enough to effect maximum economy, but which permit the use of conservative safety factors, high efficiencies and simple, economical designs.

No matter what your synthetic ammonia requirements . . . whether you plan to build a new plant or remodel an old one . . . it will pay you to investigate thoroughly *all* the advantages Chemico offers. Chemico's unmatched record of experience in designing and constructing heavy chemical plants is your best guarantee of profitable performance. Write today for Chemico Bulletin A-101.

CHEMICAL CONSTRUCTION CORPORATION

EMPIRE STATE BLDG., 350 FIFTH AVENUE, NEW YORK 1, N. Y.

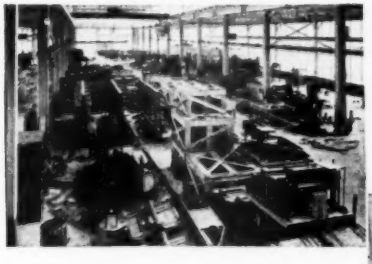
EUROPEAN TECHNICAL REPRESENTATIVE
CYANAMID PRODUCTS, LTD., BRETTENHAM HOUSE, LANCASTER PLACE, LONDON W. C. 2, ENGLAND

EUROPEAN LICENSEE OF N. E. C. PROCESS
HYDRO-NITRO S. A., 8 QUAI DU CHEVAL BLANC, GENEVA, SWITZERLAND

CC184

CABLES: CHEMICONST, NEW YORK

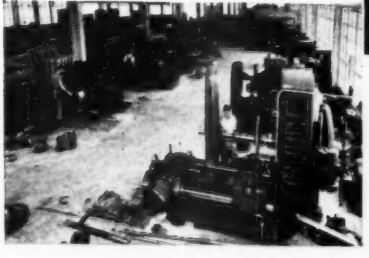
Chemico Plants are profitable investments



Here's our New Houston Plant!

The new plant and office of Link-Belt Company, 3203 South Wayside, Houston, Texas, has been designed and built to better serve the ever expanding oil industry with conveying and mechanical power transmission machinery.

For your greater convenience, the Houston plant carries complete stocks of oil field chains and sprockets, bearings (both ball and roller type), and shale shakers, in addition to the stocks already carried in Dallas and Odessa.

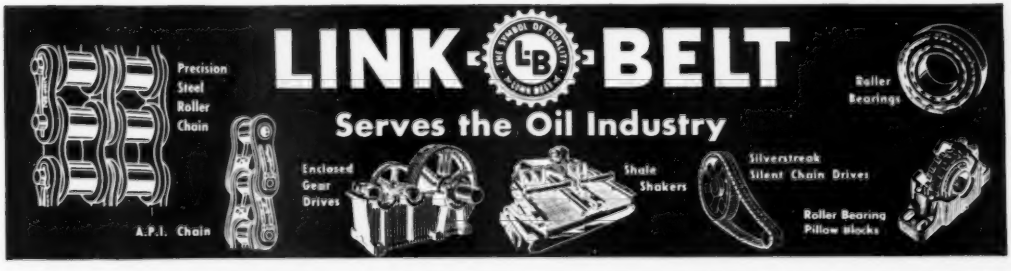


Features of the new plant are the machine and steel fabricating shops. These facilities, together with a large engineering department, enable Link-Belt to design and build special oil country equipment for you.

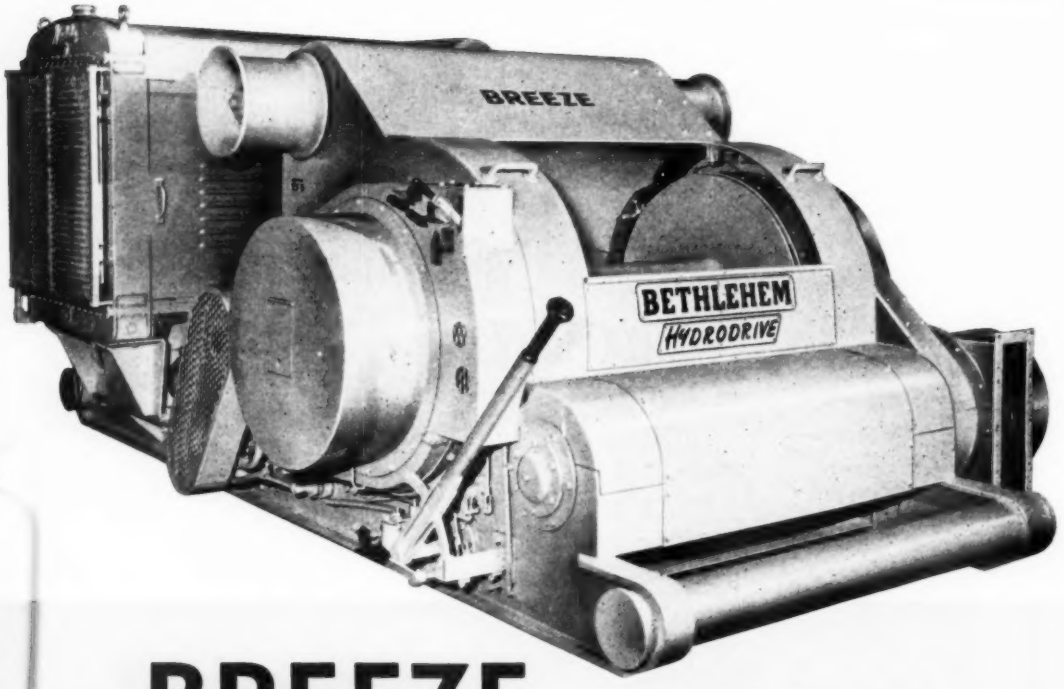
LINK-BELT COMPANY

Houston 1, Dallas 1, Indianapolis 6, New York 7, Los Angeles 33, Kansas City 6, Mo., Toronto 8.

11.648



The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1949.

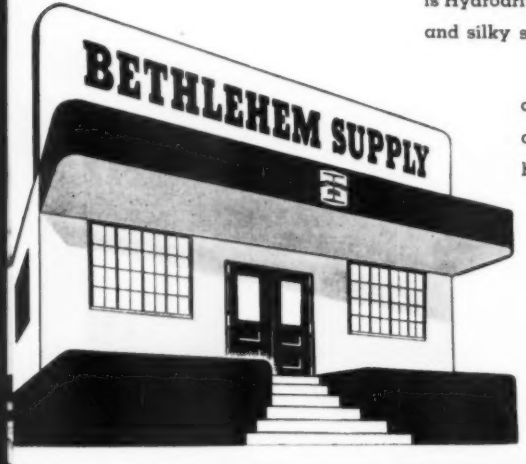


THE BREEZE... A DUAL-PURPOSE BETHLEHEM HYDRODRIVE UNIT for rotary drilling and workover jobs

This is one of the smoothest performers you'll ever encounter in the small-rig class. It's powerful, too . . . alert, responsive, eager.

The Breeze has two distinct uses: shallow drilling and medium-to-deep workover jobs. It is entirely air-controlled, has self-adjusting clutches, and is Hydrodrive-equipped. This combination means speed, ease of handling, and silky smoothness—all skillfully blended and neatly packaged.

Here's a portable rig that is far more versatile than most. It does so many things, and does them well, that it's the handyman of its class. Not expensive, either. Care for full details? A Bethlehem man will be glad to go over them with you, point by point.



BETHLEHEM SUPPLY COMPANY

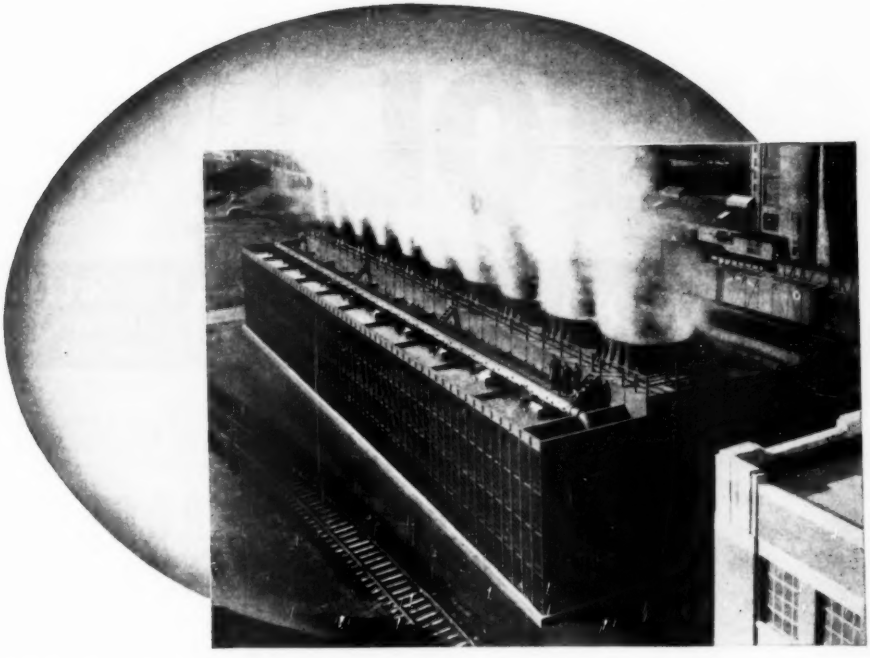
General Offices: 21 E. Second Street, Tulsa, Okla.

Subsidiary of Bethlehem Steel Corporation

On the Pacific Coast Bethlehem Oil-Field Equipment is sold by Bethlehem Supply Company of California

BETHLEHEM STEEL

Double-Flow MARLEY Double Efficiency



GIVES LOW COST WATER COOLING

Marley DOUBLE-FLOW Cooling Towers, using the practical, effective, CROSS-FLOW design (air across, water down) is the ultimate in Cooling Tower efficiency.

Only Double-Flow Cooling Towers offer outstanding, exclusive features such as:

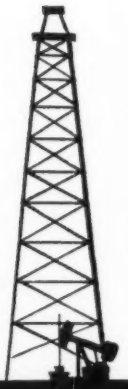
1. **OPEN DISTRIBUTION SYSTEM** . . . On top of the tower, in plain view, easy to inspect, regulate and clean.
2. **NO DEAD AIR POCKETS** . . . Every drop of water meets a steady flow of air as it splashes down thru Marley's patented nail-less filling.
3. **BETTER MECHANICAL EQUIPMENT** . . . Equipped with Marley engineered and Marley made fans, fan cylinders, drive shafts and Geareducers . . . your assurance of top quality.
4. **SOUND STRUCTURES** . . . Double-Flows have withstood hurricanes, earthquakes and corrosive atmospheres because all lumber, hardware, supports, bracing and columns are designed to make an engineered structure.
5. **COMPLETELY SAFE OPERATION** . . . Stairways, handrails, walkways, and fan cylinders insure safe operation and maintenance in any kind of weather.
6. **MINIMUM DRAFT LOSS** . . . Drift eliminators set in slanting position allow greater area for air passage, minimizing draft loss and reducing horsepower requirements.
7. **GREATER COOLING CAPACITY** . . . Packed with decks of nail-less filling, Double-Flows have larger, wetted surface therefore greater cooling capacity.

If you want to improve water cooling efficiency and reduce water cooling costs in your plant, it will pay you to ask a MARLEY "Double-Trained" Application Engineer to tell you all about the DOUBLE-EFFICIENCY of the MARLEY DOUBLE-FLOW. No cost or obligation.

MARLEY COOLING TOWERS

THE MARLEY COMPANY, INC. • KANSAS CITY 15, KANSAS

KONTOL



PROTECTS SUB-SURFACE PUMPING EQUIPMENT *against* **CORROSION**

CORROSION PREVENTIVE

A **TRETOLITE COMPANY** PRODUCT

INSURES LONGER USEFUL LIFE

RODS
PUMPS
TUBING
CASING

KONTOL forms a strongly adsorbed film on metallic sub-surface equipment, preventing contact by corrosive elements. It has been tested and proved effective in gas, gas-condensate, sweet and sour crude wells. It is easy to apply by chemical pump injection or batch-dumping down the well annulus.

For complete details on KONTOL, and information on the KONTOL corrosion rate test service, write or call

KONTOL

TRETOLITE COMPANY
Manufacturing Chemists
St. Louis 19, Missouri
Los Angeles 22, California

It's the "EXTRAS" that make this Beechcraft a better buy!

★ **Extra speed** — The Beechcraft Bonanza achieves its high speed *without engine overload*—170 mph cruising speed at 8,000 feet using but 56% of the maximum rated take-off power. You buy a plane to *make time*. In a Beechcraft, you *get* it!

★ **Extra ruggedness** — Beechcraft Bonanza framework is stronger than conventional construction. Shock and stress tests far surpassing CAA requirements have proved the extra ruggedness of every inch of the Beechcraft Bonanza—from landing gear to cabin roof!

★ **Extra economy** — Extra low fuel consumption of 9.5 gallons per hour at cruising is part of the Beechcraft Bonanza's operating economy. Another vital "extra" is low maintenance due to freedom from engine overload. The Beechcraft Bonanza saves your money!

★ **Extra safety** — The Beechcraft A35 Bonanza has been dived under radio control at 275 mph—and pulled out unscathed at 3 G's! On the ground, the Beechcraft Bonanza's wide tread, long wheel base, and cross-braced struts defy the roughest handling, the roughest terrain.

★ **Extra performance** — No airplane yet designed can beat the high performance of the Beechcraft Bonanza—its unexcelled combination of speed, range, and fuel economy. Its flight characteristics make it one of the easiest planes in the world to handle!

★ **Extra power** — The extra margin of power in a Beechcraft Bonanza comes from aerodynamic design which requires but 56% of the engine's power at cruising. Never before has so little power been needed for such high performance by so rugged a plane!

★ **Extra range** — The extra range you get in a Beechcraft Bonanza—750 miles—makes it *real transportation*. Equipped for long distance flight, it is the most practical of all planes for business use—with a *commercial* margin of safety, speed, and range!

★ **Extra utility** — The Beechcraft Bonanza is a business plane, engineered for extra usefulness as a business vehicle. It can be operated the year around. It can get into small, unpaved landing fields as well as modernized airports. It is ready to go—365 days a year!

★ **Extra comfort** — From the moment you step (not climb!) into a Beechcraft Bonanza through its wide, auto-type door and settle yourself in its uncrowded 4-place interior, you're conscious of superb comfort. Its sound-proofing is the standard of comparison!

★ **Extra luxury** — Skilled design and placement, with superb interior appointments, make the Beechcraft Bonanza an aerial limousine. You'll lean back and relax and enjoy air travel as never before! Its only rival for sheer luxury is the multi-engined airliner itself!

Compare these performance features

- Top speed, 184 mph
- Cruising speed, 170 mph
- Range, 750 miles
- Service ceiling, 17,100 feet
- Fuel economy, 9½ gal. per hour

Compare these comfort features

- Exclusive retractable step
- Limousine entrance
- Insulated, sound-proofed cabin
- Quickly removable rear seat
- Luggage compartment accessible two ways

● These are only the highlights among hundreds of reasons why the Beechcraft Bonanza is a better buy! *See* it today! A note on your company letterhead will bring illustrated brochures describing the Beechcraft Bonanza's many *extra* advantages. Write to Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

Beechcraft

BONANZA MODEL A35

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

great names

UNIVERSAL
POWER DRIVEN SLUSH PUMPS
500 H. P., 7¼" x 16"

Power Driven Slush Pumps made of all Steel Construction to offer maximum strength with the least possible weight. This affords easier transportation and rigging. The alloy steel fluid end is fully streamlined to reduce turbulence and hydraulic friction thus obtaining maximum output with less horsepower. The Universal 500 HP - 7¼ x 16" Slush Pump weighing only 28700 pounds has extended pinion shaft so that power may be delivered to either side. Manufactured by LFM Co., Atchison, Kansas. For all your drilling and producing needs call United and get the best.

Uncle Sandy THE UNITED SUPPLY MAN

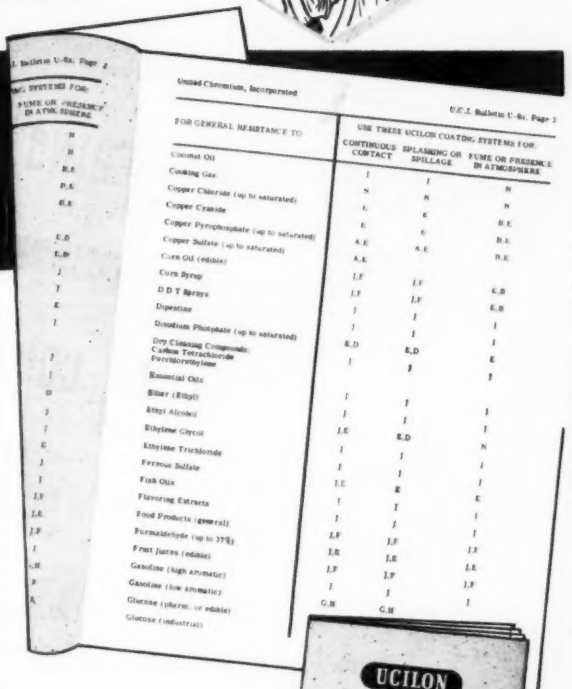
1100= W.P.
WITH 7¼" LINERS

Courtesy
Service
Dependability

UNITED SUPPLY
AND *Manufacturing* COMPANY
TULSA, OKLAHOMA
Stores in Kansas, Oklahoma, Texas,
Louisiana, and New Mexico

Are your CORROSION troubles listed here?

Control them systematically with UCILON Protective Coatings and the help of this booklet

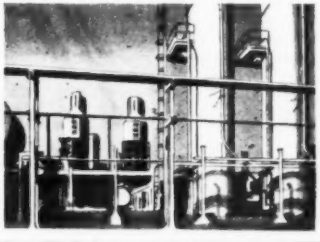


Users of Ucilon coatings are acclaiming this systematic method for controlling corrosion as they report getting longer life from equipment plus lower maintenance costs. It may be the practical answer to your own problem.

First, we send you this 32-page booklet. It lists common agents responsible for failures of ordinary paints and the subsequent corrosion of equipment. For each of the 153 agents listed, it presents a recommended system of Ucilon protective coatings for use against the specific trouble—one which has proved it can lick the corrosion problem to a "standstill." There are systems that resist acids, alkalies, salts, oils, water, organic materials.

You choose the best system for your application, and by so doing you automatically select the required coatings from the complete Ucilon line. Then follow the complete instructions for carrying out the system.

See what a big difference such a systematic approach to corrosion control can make in your plant. You'll learn why Ucilon Systems succeed so often where other coatings fail.



A MIDWEST OIL COMPANY, for example, coated stock tanks for crude oil where salt water corrosion had been severe. Inspection *2½ years* later showed that the tank interiors were in excellent condition — and that there was still no sign of failure in the Ucilon coatings!

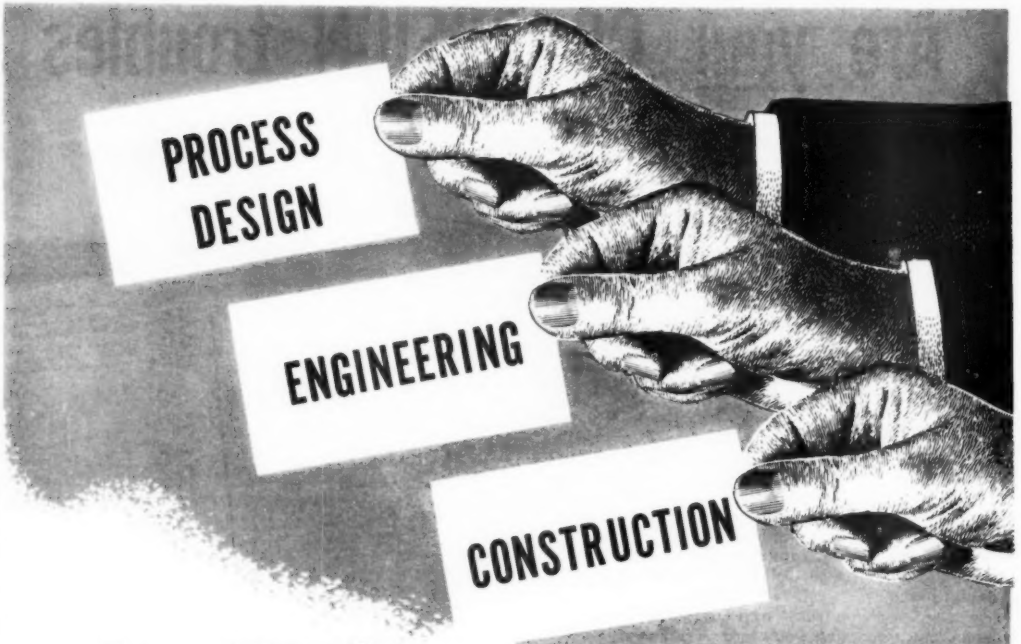
Take advantage of modern, engineered surface protection. Send for your copy of this booklet.

UCILON Protective Coatings

Reg. U.S. Pat. Off.

UNICHROME products of UNITED CHROMIUM, INCORPORATED

51 East 42nd St., New York 17, N. Y. • Detroit 7, Mich. • Waterbury 90, Conn. • Chicago 4, Ill. • Dayton 2, Ohio • Los Angeles 13, Cal.



Every Detail in Capable Hands

FROM THE "PLANNING TABLE" TO COMPLETED PROJECT

With an impressive background of actual experience together with a thorough understanding of the refining industry requirements, the W. M. Barnes Company offers a complete *one-stop* service . . . Every detail in Process Design, Engineering and Construction—from the moment of planning to final project operation—is in capable hands. When you want *more* than a promise on your individual problems, consult "BARNES" at any of the offices listed below.

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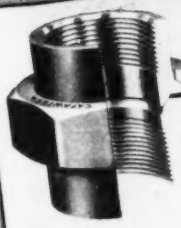
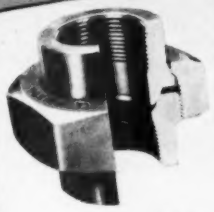
Catawissa Unions and Check Valves...

for greater operating efficiency and economy in every oil-field service



CATAWISSA NO. S-1A

The hot-forged steel union with heavy, coarse ACME threads in the union nut for quick make-up or disconnecting in the field.

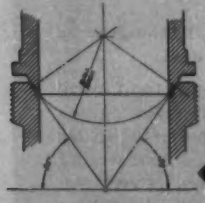


CATAWISSA NO. S-1

Hot-forged steel unions with U. S. Standard V-Threads in the union nut are recommended for general oil-field service.

CATAWISSA NO. 502 CHECK VALVE

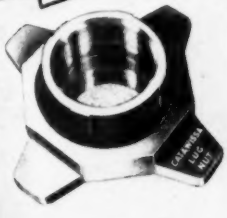
Accessible, efficient, economical, Catawissa Double Union Swing Check Valves are full opening and are furnished with union connections on both ends, eliminating the union and nipple necessary to install the regular type check valve. They are the flow-line type designed for use where no stop is installed close to the check valve.



BALL-TO-ANGLE SEAT

CATAWISSA NO. L-1A

This union is furnished with a 2-lug nut which can be applied with either a hammer or wrench. The triangular shape eliminates distortion or breaking. Designed with coarse ACME threads for general service on drilling rigs and all piping purposes where quick make-up is desirable. Available in standard and double extra heavy weight. Sizes 1" to 3" inclusive.



CATAWISSA NO. L-1-4A

Made in 4-inch size with four lugs on the nut.

"OILWELL" store and warehouse points are stocked with a complete line of Catawissa forged-steel unions and check valves. These Catawissa products are designed and recommended for the rough-and-ready demands of any oil country application.

NOTE THESE IMPORTANT FEATURES

HOT-FORGED . . . from solid, rectangular steel bars, Catawissa Unions are free from sand and blow holes. They will expand and contract with the pipe, assuring tight joints.

THREADS . . . Catawissa Unions and Valves are supplied with either FULL ACME Threads or U. S. Standard V-Threads in the union nuts and on the female end.

SEATS . . . in all Catawissa Unions are a 55° angle on the female end to a Ball on the male end, assuring a perfect seal even when the pipe is not perfectly aligned. Carefully hand-ground seats which require no packing are inspected and tested under water to assure holding qualities.

Contact your nearest "Oilwell" representative to assist you with all your oil-field problems

OIL WELL SUPPLY COMPANY

Branches Serving All Oil Fields

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USS "OILWELL"

UNITED STATES STEEL

GMC radiator grilles are as durable as they are distinctive. All 300 to 900 series grilles are frame-mounted, angle-braced and surrounded by bars of heavy, spring steel bumper stock.

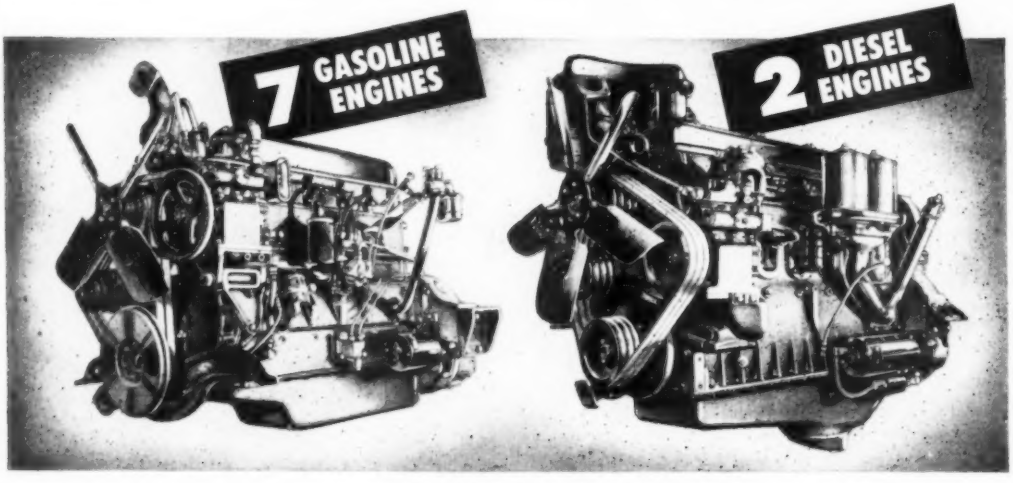
BACK OF THESE "BUMPER-BAR" GRILLES . . .

Best Engines in the Business

The increasing popularity and acceptance of GMC trucks are reflected in current registration figures which show GMC making substantial gains in new truck sales. In fact, new GMC truck registrations are the highest in the Company's history according to latest available figures.

Much of this increase can be attributed to the famous GMC truck-built engine line . . . because everyone recognizes the engine as the "heart" of any motor truck.

GMC now offers an engine range to fit every vocational requirement. Each engine, gasoline or Diesel, is the most powerful in its class with the most advanced features of design and construction ever offered by GMC. From every angle GMC truck engines are the "best in the business" . . . from every angle the best for your business.



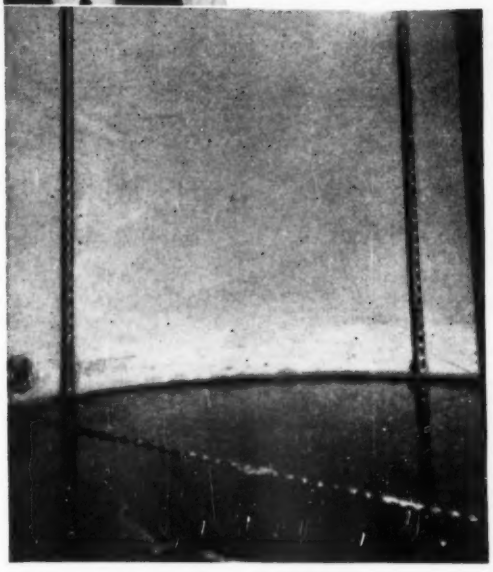
GMC gasoline engines range from 228 to 503 cu. in. displacement and from 95 to 190 horsepower. From the smallest to the largest, they are all GMC-built . . . all of war-renowned "Army Workhorse" design.

GMC
GASOLINE • DIESEL
TRUCKS

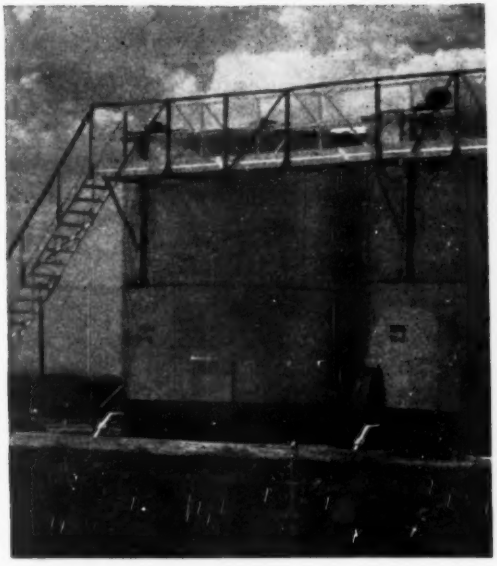
GMC Diesel trucks are powered by famous GM 2-cycle four and six cylinder Diesel engines that are outstanding for light weight and great economy. The four develops 133 horsepower; the six provides 200.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

Inside story proves 3M protective coatings' amazing resistance to sour crude



STORAGE TANK INTERIOR, McElroy Lease, Texas. After two years exposure, "Coro-Gard" coating in good condition. Tank metal unaffected by corrosion.



STORAGE TANK EXTERIORS can also be given lasting protection and neat appearance with "Coro-Gard" coatings. Flat, glossy, or anti-skid finishes are available.

Get longer tank life with anti-corrosion "Coro-Gard"

When a better, more dependable protective coating for crude-oil storage tanks is needed, choose "Coro-Gard". Tank life is increased, corrosion damage lowered.

This synthetic-resin coating has been tested and proved under the most strenuous conditions. It guards metal against chemical fumes or spillage, salt or fresh water spray or immersion, high humidity, solvents, petroleum impurities, many other caustics.

There are 15 basic "Coro-Gard" Protective Coating Systems, each developed to save you money on your specific service conditions. Why not ask our engineering department for free advice? No obligation.

WRITE TODAY for complete information about cutting the cost of treating equipment, prolonging the interval between coating and re-coating. Address our Adhesives and Coatings Division in Detroit.

CORO-GARD
BRAND
ANTI-CORROSION
COATING

Made in U. S. A. by **MINNESOTA MINING & MFG. CO.**
Also makers of "Scotch" Brand Pressure-sensitive Tapes, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.

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AO PANORAM Goggles

Workers have a "first row orchestra" view of the work with "Panoram"

AO's Wide-Vision Safety Goggle!

Seeing area is at a maximum in this wide-vision goggle. Worn over prescription glasses or worn alone, its plastic frame, eyecups and replaceable lenses in either clear or green acetate provide snug, face-conforming protection. Eyecups vented at top and bottom assure ample ventilation and minimize clouding of lenses. Bridge is the floating saddle type that fits comfortably without pressure. Elastic headband is extra wide and easily adjustable.

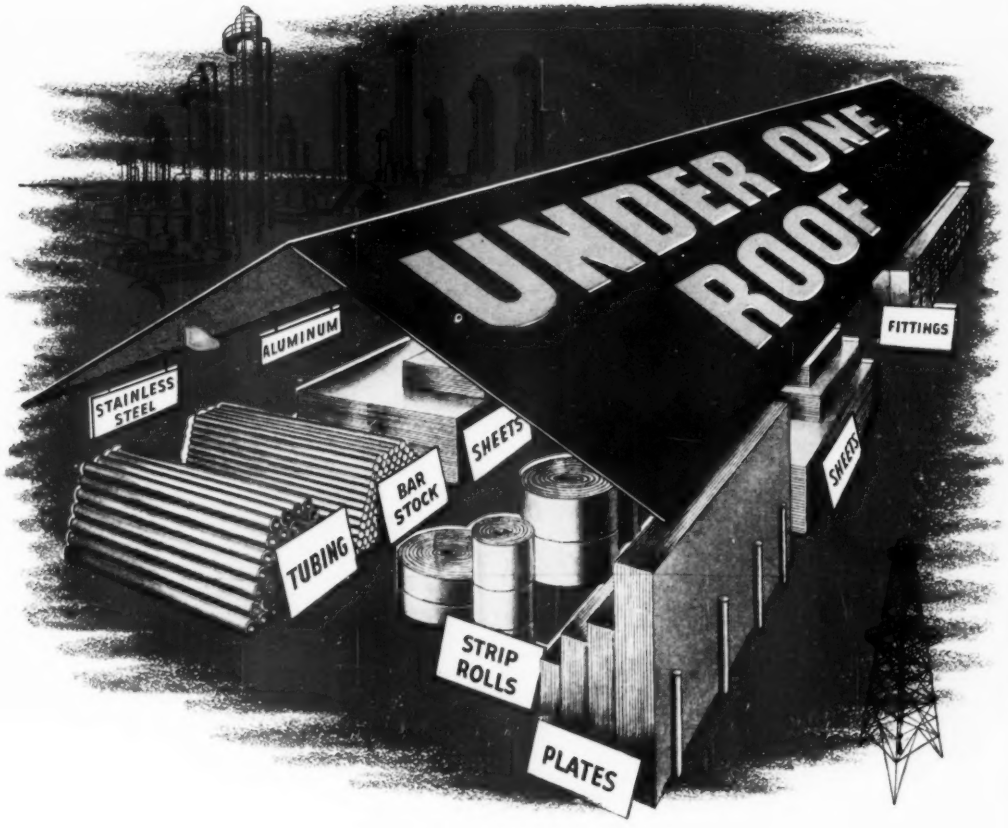
The AO Panoram Goggle protects against foreign particles attacking from any direction. It is recommended for chipping, grinding, babbitting, riveting, rail cutting, spike driving, spot welding, hand tool and similar operations. Your nearest AO Safety Products Representative can supply you.

The AO Panoram Goggle is available in the following models:

NO. 600 — Clear Frame, Clear Lenses
NO. 601 — Clear Frame, Green Lenses
NO. 602 — Green Frame, Clear Lenses
NO. 603 — Green Frame, Green Lenses

American Optical
COMPANY
SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities



COMPLETE "ON-CALL" STOCKS FOR YOUR SPECIALIZED METAL NEEDS

"One-call service... for on-call metals"

Geared to industry's continuous demand for specialized metals, Metal Goods' one-call service is designed to make your metal procurement easier — and more efficient. By having the metals you need "on-call" from your Metal Goods warehouse — *when* you need them — you can eliminate costly metal inventories... save storage space... reduce materials handling... and gain efficiency through simplifying your supply effort.

Metal Goods warehouses are strategically located to serve you quickly and dependably. Sheets, Plates, Tubes, Bars, Fittings and Accessories of... **STAINLESS STEELS ALUMINUM • BRASS • COPPER • MONEL* • NICKEL* • INCONEL***

Plus... complete stocks of Condenser and Heat Exchanger Tubes... Admiralty... "Alclad" Aluminum... 70/30 Super-Nickel, Monel.

Tube Sheets... Naval Brass... Muntz Metal

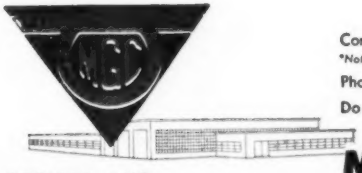
Fittings and Accessories

Consult your Metal Goods metallurgical specialist on the proper metal for your application.

**Not warehoused in Kansas City or St. Louis*

Phone, wire or write your Metal Goods warehouse for your specialized metal needs.

Do you have the "Metalog"? It's a complete stock list and metal manual — Write for it!

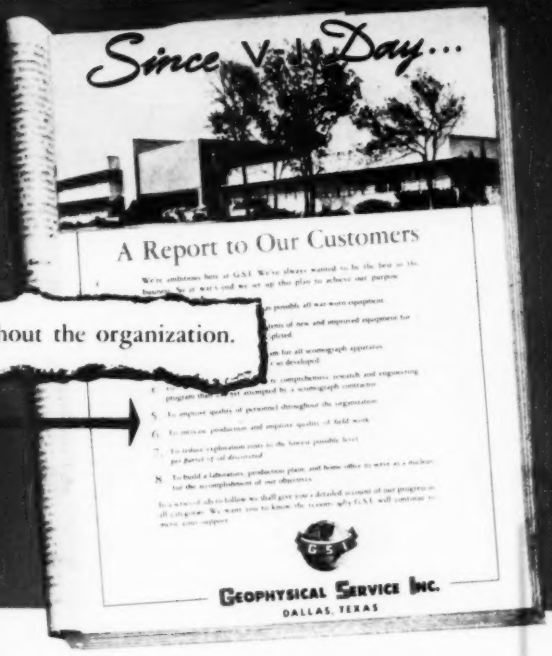


METAL GOODS CORPORATION

OFFICES AND WAREHOUSES: **St. Louis,** 5250 Brown Ave. • **Houston,** 711 Milby St. • **Tulsa,** 302 N. Boston
New Orleans, 432 Julia St. • **Dallas,** 6211 Cedar Springs Rd. • **Denver,** 817 17th St. • **Kansas City,** 1300 Burlington

New Methods require
PREFORMED
WIRE ROPE
When increased production is a must . . . or when new equipment is installed, Preformed wire rope offers definite advantages. Here's why:
● Preformed saves time and money —on installation and in operation
● Preformed handles easier, faster, safer
● Preformed performs better, particularly over small sheaves
● Preformed lasts longer
Whatever your methods may be, if wire rope is involved, make sure it's Preformed. Ask your manufacturer or supplier for Preformed.

Report No. 5



5. To improve quality of personnel throughout the organization.

IMPROVING THE QUALITY OF PERSONNEL, TO US AT GSI, MEANS...

Careful Selection

23 colleges and universities on the North American continent are visited or contacted annually for suitable graduates.

Thorough Indoctrination

100% of new employees receive complete job training and safety instructions.

(Observers, for example, are trained as assistants in the field and are then returned to Dallas for formal instruction courses.)

Refresher Training

In the last two years:

90% of GSI's experienced observers attended refresher classes in Dallas.

50% received GSI correspondence courses on latest field techniques.

10% of our drillers have already returned to Dallas for a recently instituted training course in drill maintenance and operation.

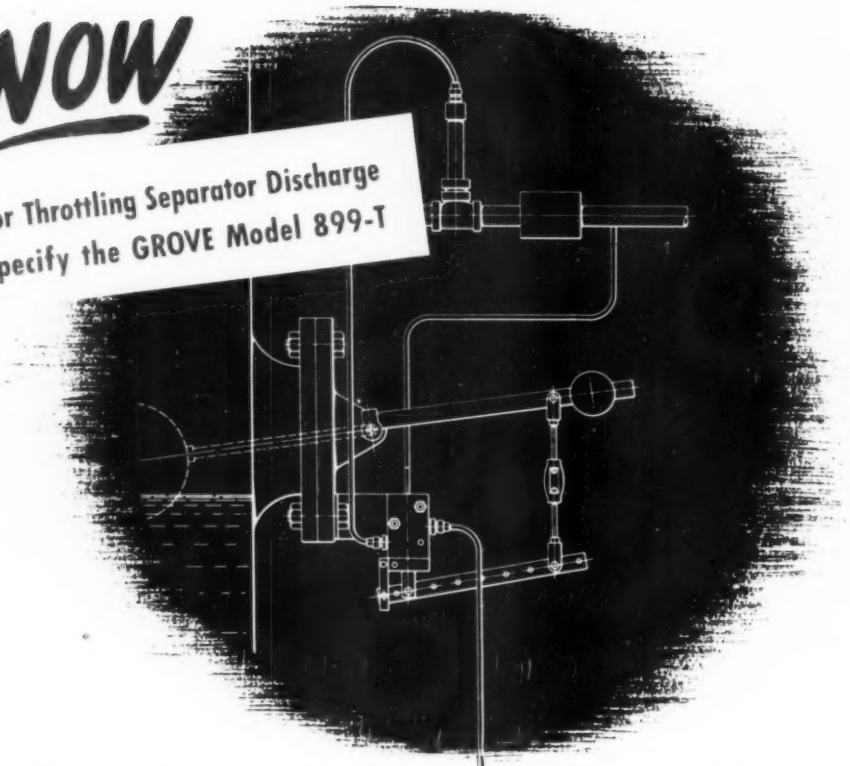
It's the continuance of these policies —year in, year out—that assures you of better seismic service from GSI.

GEOPHYSICAL SERVICE INC.

DALLAS, TEXAS

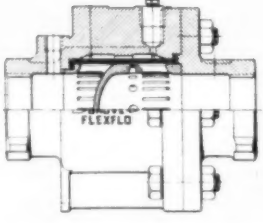
NOW

...for Throttling Separator Discharge specify the GROVE Model 899-T



To fill the need for a valve specifically designed for throttling oil separator discharge, Grove offers the Model 899-T. This combination unit features all the advantages of the widely accepted Flexflo Valve, controlled by a Grove designed lever-operated valve for throttling service.

Flexflo Valves operate on the automatic pressure-balance principle, with a closed actuating system sealed off from line fluid. Their only moving part is a flexible synthetic rubber tube that gives a safe, sure seal without friction or shock. The Flexflo Valve cannot be wedged open by foreign particles, and operates free from slam or chatter.



The F-Series Operator, a special design for this service, employs the Grove patented O-ring Seat-Seal principle to give positive control in response to the slightest float movement. When oil flow shut-off is required, the operator matches the Flexflo in its absolutely bubble-tight closure.

For a new high in dependability—and a new low in maintenance costs—investigate the Model 899-T. Write, wire or call your nearest Grove representative.

GROVE REGULATOR COMPANY

65th & Hollis Street Oakland 8, Calif.

1930 W. Olympic Blvd., Los Angeles 6, California
205 E. 69th Street, New York 21, New York
3608 Navigation Blvd., Houston, Texas
310 Thompson Bldg., Tulsa 3, Oklahoma

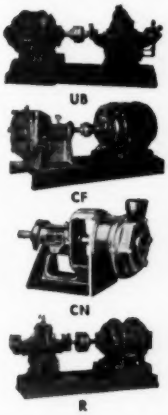
GROVE

ANOTHER Flexflo APPLICATION

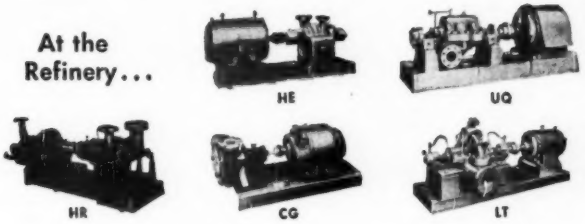
MODEL 899-T
Separator
OIL VALVE

"I could save real money if I could only centralize my purchases of pumps and standardize on one dependable make."
"You can! The complete Worthington line gives you the answer to almost any petroleum pumping problem."

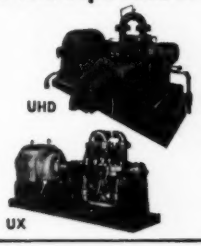
In The Field...



At the Refinery...



On The Pipe Line...



For Loading...

THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB

LET WORTHINGTON WORK WITH YOU

Yes, WORTHINGTON...the world's largest manufacturer of pumps... offers you complete service in petroleum pumps for applications in the field, in the refinery, on the pipe line and for loading operations. Why not take advantage of WORTHINGTON's long experience in petroleum pumping problems to lower your cost by standardizing on this single, dependable source?

For complete information on any specific pumping application that will prove *there's more worth in Worthington*, write: *Worthington Pump and Machinery Corporation, Centrifugal Pump Div., Harrison, New Jersey.*

MEMBER

WORTHINGTON

C8.4

Types HR and HB. Twenty sizes. Capacities up to 1800 g.p.m. Developed heads up to 900 ft. Proper selection of material permits use for temperatures far below zero to 800°F., for pressures from high vacuum to 750 lb. per sq. in. gauge.

Type HD. Hydraulically-balanced, double-suction impeller handles boiling liquids with low subversence. Capacities range from 60 to 3200 g.p.m. at heads up to 700 ft., temperatures up to 850°F., pressures up to 550 lb.

Type WH. High-pressure, high-temperature, centrifugal hot-charge pumps. Twelve distinct points of superiority, based on years of experience building pumps for high pressures and temperatures. Capacities to 2000 g.p.m., heads to 5000 ft.

Type HL. Several construction arrangements permit flexibility in application. Designed for temperatures up to 925°F., or higher with water-jacketed stuffing box. Capacities up to 1600 g.p.m., heads to 500 ft.

Where WeldOlet is attached to run pipe, it tapers at proper angles, providing for a single bevel groove joint at the crotch section, blending into a V-butt joint at the ear portion.

The quickest — most economical — way to insure FULL PIPE STRENGTH AT BRANCH CONNECTIONS

WeldOlets*, with outlet sizes from ⅛" to 24", both straight and reducing, need no additional reinforcement to establish and fully maintain original strength on ASTM A-106 Seamless Steel Grade A Pipe, as set forth in Code for Pressure Piping, American Standards Association, B31.1-1942, and Supp. No. 2, B31.1b-1947. WeldOlet welding fittings provide the quickest, most economical, most *satisfactory* method of obtaining *full pipe strength* at branch connections. For detailed engineering reference data, write for Catalog W-2.

BONNEY FORGE & TOOL WORKS

FORGED FITTINGS DIVISION • 366 GREEN STREET • ALLENTOWN, PENNA.
Authorized Canadian Distributor: Sterling Steel Co., Ltd., 20 Temperance St., Toronto 1, Canada
MANUFACTURERS OF FAMOUS BONNEY TOOLS

Fig. 1—Cut-away view of reducing size WeldOlet with welding outlet in place. The external rib and wide bases or footings of WeldOlets* eliminate the need for *extra supports* to take care of bending or vibrational stresses at crotch section, the point of greatest stress.

Fig. 2—Note blending of ear portion of welding fitting to run pipe. Extension of weld metal below inside scarfed portion of pipe insures all sections of joint greater than pipe wall thickness.

WELDOLETS

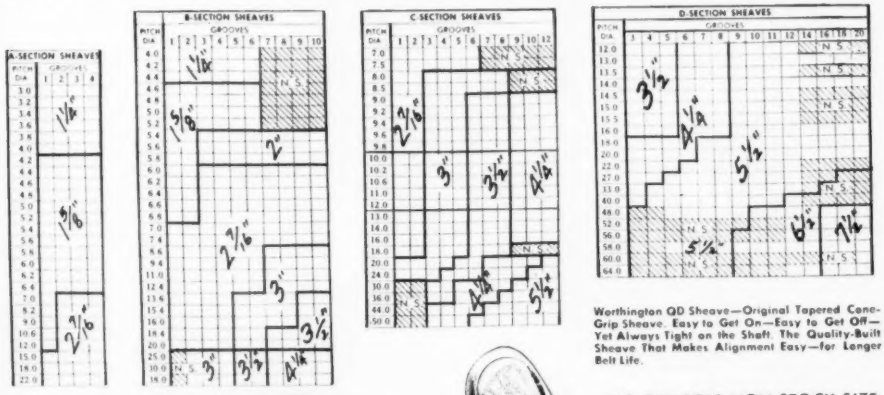
*Trade Mark Reg. U.S. Pat. Off. Pat. in U.S. & Foreign Countries

FOR WELDED BRANCH PIPE OUTLETS

When you want Bonney Welding Outlets, ask for WeldOlets*

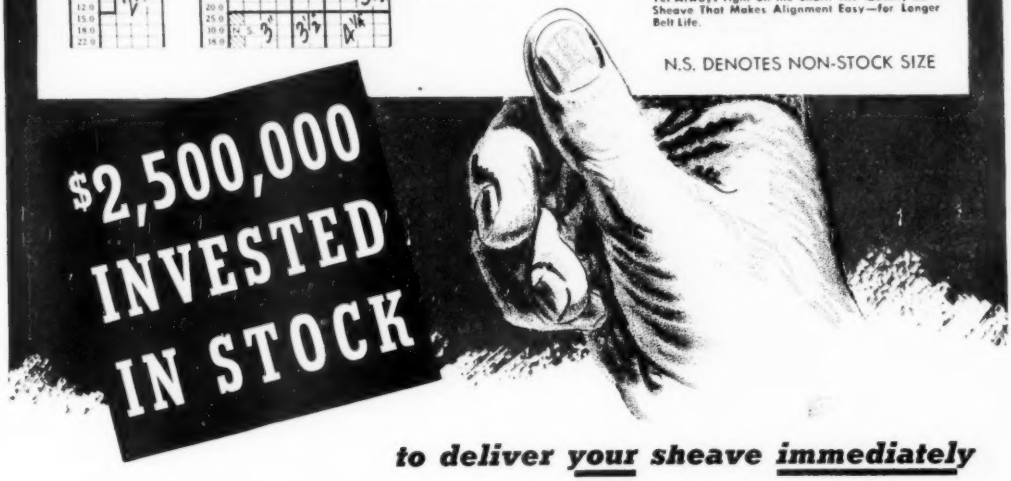
THE GOOD RIGHT HAND OF INDUSTRY

STOCK SIZES WORTHINGTON HEAVY DUTY "QD" SHEAVES WITH MAXIMUM BORES INDICATED



Worthington QD Sheave—Original Tapered Cone-Grip Sheave. Easy to Get On—Easy to Get Off—Yet Always Tight on the Shaft. The Quality-Built Sheave That Makes Alignment Easy—for Longer Belt Life.

N.S. DENOTES NON-STOCK SIZE



to deliver your sheave immediately

As long as it takes our distributor's shipment to get there is as long as it takes—in most cases—to get exactly the sheave you need into your hands. Your Worthington distributor has practically any stock size you'd ever call for—if he hasn't, one of the Worthington warehouses will get it to him in 24 hours or less.

Check your sheave requirements. With more sheaves listed as "stock sizes" and more sizes in stock than any other distributor, your Worthington distributor may be able to save you the cost of a special sheave.

Top-ranking distributors in the oil fields handle Worthington QD Sheaves and Worthington-Goodyear V-belts. They are backed by Worthington warehouses whose stocks duplicate the factory stock at Buffalo—more sizes stocked than any other sheave on the market. With 853 sizes in "A", "B", "C" and "D" section, ½ to 600 hp, you can fill almost any rpm requirement with a *stock* sheave. Also: 332 listed stock sizes of EC Cord V-belts.

So, when you need sheaves, call your local oil-field dealer.

For Balanced Drive Performance

Specify Worthington Multi-V-Drives, with QD Sheaves and Worthington-Goodyear EC Cord V-belts. (Goodyear EC Cord or Steel Cable V-belts are used exclusively in Worthington Multi-V-Drives.)

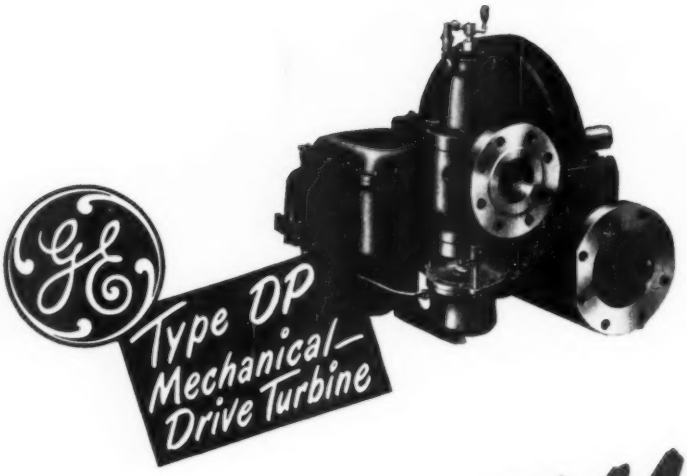
WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION
MULTI-V-DRIVE SALES DIVISION
Buffalo, New York—General Offices: Harrison, New Jersey

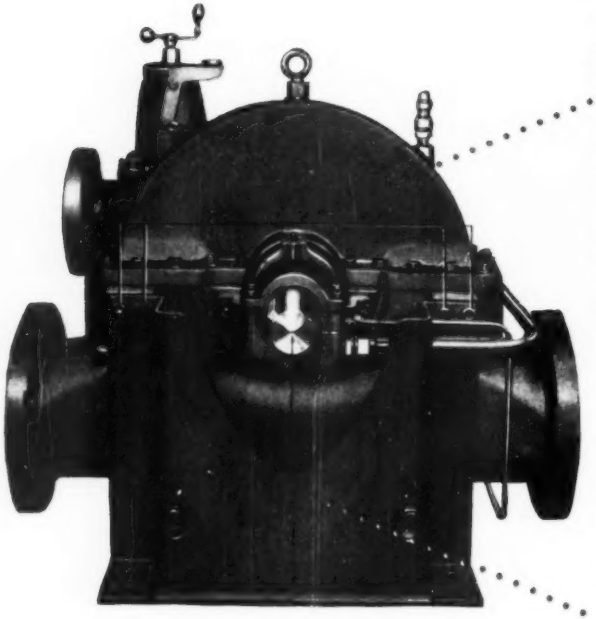
The Good Right Hand of Industry

POWER TRANSMISSION: sheaves, V-belts, variable speed drives
PUMPS: centrifugal, power, rotary, steam
AIR COMPRESSORS: water-cooled, air-cooled

MVD92B



SAVE TIME ON



Turbines supported at the centerline save many mis-alignment headaches both during and after installation. In general, this method of support cuts down shaft "lift" from casing heating to less than a quarter of the lift of foot-supported units.

Thus, unless casing temperatures are high, G-E standard turbines can be lined up cold with the assurance that shaft lift will be within allowable limits when the turbines are heated. No calculations or adjustments for setting the shaft low when cold will be required.

With the unit in line hot or cold, shaft whipping, which often causes bearing burn-outs, excessive vibration, and coupling wear, is eliminated.

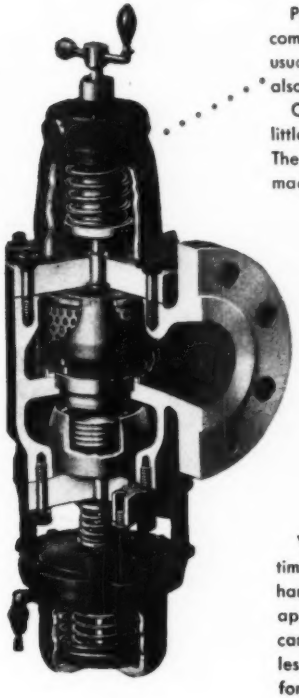
You save time when coupling the turbine to the driven unit, since the shaft height is identical on all G-E standard turbines. Not only that, but shaft diameter, keyway dimensions, etc., are identical on all turbine frame sizes. This standardization saves lost motion when installing or re-locating turbine drives.

INSTALLATION!

WITH GENERAL ELECTRIC STANDARD TURBINES

SAVING time when installing or re-locating turbines is one of the important advantages of using G-E standard turbines. Many other advantages: wider range governing, pressure lubrication, fewer wearing parts, are also standard with the Type DP —at no extra cost.

If you are planning installation of turbines, check with your G-E representative. He'll gladly give you application assistance and complete data. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*



Piping is simplified with G-E standard turbines. The combined trip-throttle valve—an exclusive G-E feature—usually makes a separate shut-off valve unnecessary. This also saves the cost of an extra valve.

Once installed, the combined trip-throttle valve requires little maintenance. There are no soft packings to replace. The steam strainer in the valve assembly is easily removed, made of Monel metal to resist corrosion.

With a new installation there's no need for you to spend time selecting spare parts it may be desirable to have on hand. This standard set of packaged spares contains parts applicable to DP turbines of all ratings. One set of spares can thus service several turbines. The price is very low—less than 25% of the price of a comparable set of spares for previous designs—thanks to standardization.

GENERAL ELECTRIC

flanged head end assembly

Brown Fintube Head End Construction Eliminates Operating and Maintenance Troubles of Ground Joints and Screw Unions

BROWN FINTUBE'S *advantages*

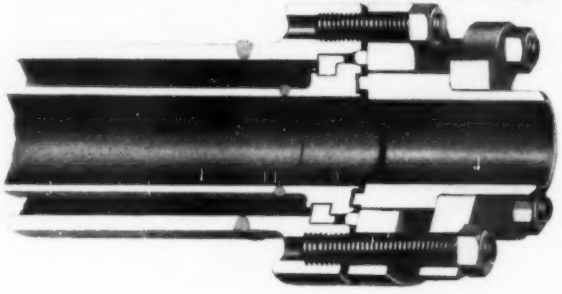
EXTREME FLEXIBILITY
Easily Adapted to Changes in Duty
NO OBSOLESCENCE
Avoiding Waste and Expense
FLANGED HEAD END ASSEMBLY
Eliminating Ground Joint Seals
EASY MAINTENANCE
Using Only Common Tools
CONTINUOUS OPERATION
No Shut-Downs For Cleaning
REDUCED STORES REQUIREMENT
Minimizing Investment and Handling
QUICK DELIVERY
Only a Few Hours in Emergency
INCREASED CORROSION ALLOWANCE
Longer Tube Life

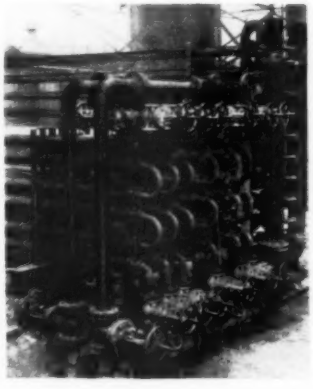
● Engineering, operating and maintenance men all enthusiastically endorse our flanged head end construction which avoids pack joints, glands, ground joint seals, screw unions, and all the operating and maintenance trouble resulting from ground joint and screw union construction.

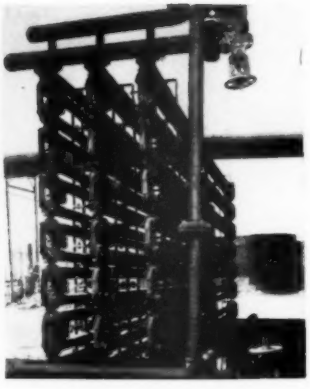
The seating surfaces are in full view of the operator, and easily accessible. This permits them to be wiped clean of all dirt and grit before closing the seal — not possible when ground joints are used.

The metallic sealing ring used in Brown Fintube Exchangers is recognized by engineers everywhere as the ideal closure. It overcomes any slight unevenness of the seating surface and permits tight, leak-proof seals to be "made," and "broken" easily and quickly, without tortional stress or twisting — assuring trouble-free operation far surpassing that afforded by other types of closures.

For the utmost in efficiency and economy, use Brown's proven, welded fintube heat exchangers throughout your plant. Estimates and quotations furnished promptly. *Write for Bulletin No. 481.*

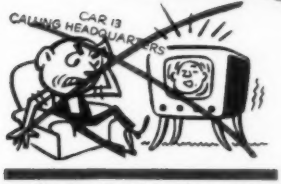




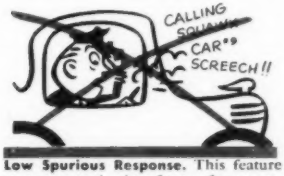


THE BROWN FINTUBE CO.
ELYRIA, OHIO

SECTIONAL HAIRPIN HEAT EXCHANGERS



Low Spurious Emission. The FLEETFONE more than meets FCC rules. Spurious emissions are well down at all frequencies—not just in the 30-50 Mc band alone.



Low Spurious Response. This feature cuts out annoying interference from transmitters operating on other frequencies.

Transducer Modulation Control. It holds your voice level constant whether you shout or whisper into the "mike." Introduces no distortion at high levels. This feature more than meets FCC rules.

HERE'S YOUR ANSWER

to better 2-way radio communication

It's here—everything you want in a *single* compact unit—the RCA FLEETFONE.

Higher Power Output. Your choice of 30 or 60 watts in the same size package.

Easy to Install. "Sandwich" construction offers the widest choice of installation possibilities.

Higher Sensitivity. Better than 0.3 microvolt, that brings in the signals after other receivers have lost them.

Low Spurious Emission. 60 db down at *all* frequencies; 80 db down between 30-50 Mc.

Low Spurious Response. 90 db over *all* frequencies; images down 100 db.

"Canyon-Curve" Selectivity. Prevents annoying interference from neighboring channels.

Transducer Modulator Control. Keeps you from "crowding" into the other fellow's channel.

Choice of 6- or 12-volt Operation. Ideal for lightweight vehicles or heavy trucks.

More than Meets All FCC Rules. Your assurance of best possible mobile communication. Your protection against early equipment obsolescence.

For complete information, write Department 122J, RCA Engineering Products, Camden, New Jersey.

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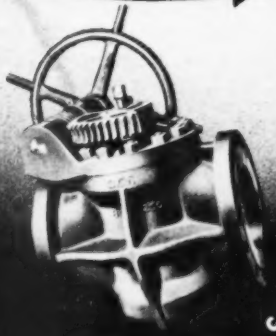
FULL PIPE AREA CYLINDRICAL PLUG...

Stands alone in its ability to minimize turbulence and change of velocity, without use of larger-than-pipe-size valves. Quick operation, if needed, no wedging, lubricated for long life and corrosion protection...why anything but an a.c.f. Lubricated Plug Valve.



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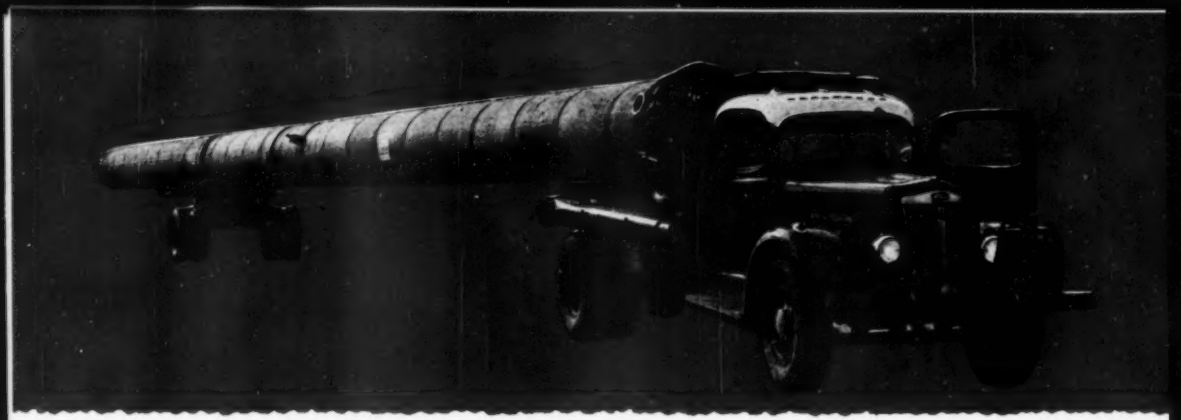
LUBRICATED

Representatives in more than 50 Principal Cities.

a.c.f. Valves are available in many types and sizes. Ask for catalog 4-OG. American Car and Foundry Company, 30 Church St., New York 8, N. Y



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Pressure Vessels

OF ANY SIZE AND DESIGN

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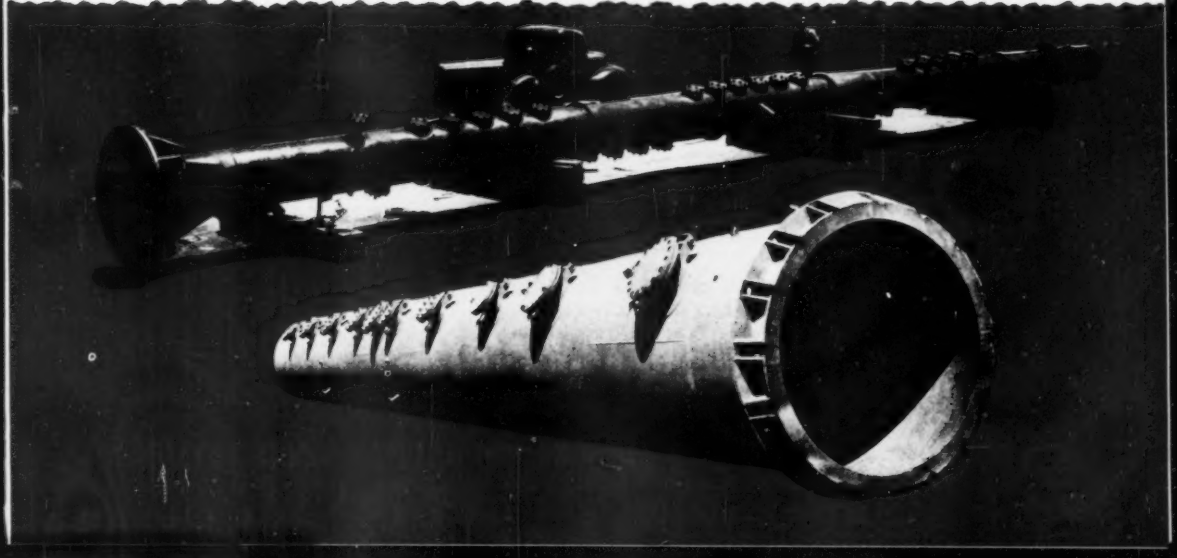


For a processing problem like this...

"...severe corrosive conditions resulting from high sulphur content of sour crude oils..."

NATIONAL TUBE might recommend:

ANALYSIS No. 12*

Type of Steel—5 Chromium, ½ Molybdenum

In equipment involving severe corrosive conditions such as processing of very sour crude oils containing large amounts of sulphur, only the higher chromium compositions, such as 5% Cr, .5% Mo stabilized or the 18-8 alloys are recommended.

FINDING the answer to refinery tubing problems isn't always as easy as the above instance might indicate. But when NATIONAL does come up with a recommendation, you can depend on it being the best possible for your particular case.

How can we justify such a statement? Because we study conditions as they actually exist in your plant (usually from what you tell us; sometimes by sending a tubing specialist for a personal observation). We then check the information thus obtained against our large and growing file of past problems involving similar conditions which have been successfully solved with NATIONAL Seamless Pipe and Tubes. That's how NATIONAL developed many of the *25 different* analyses of Still Tubes, Condenser and Heat Exchanger Tubes, and Refinery Piping which we now offer the industry. We call it our "Complete Tube Service."

We invite you to bring your problems to NATIONAL. It's the easy, proven way to select the *proper* refinery tubing for your plant. An inquiry entails no obligation . . . and our recommendations may solve your problem.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
(Tubing Specialties Division)
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

NATIONAL TUBE offers you

Seamless Steel Still Tubes · Condenser Tubes
Heat Exchanger Tubes · Refinery Piping in

25 DIFFERENT ANALYSES

- Low Carbon
- Low Carbon, ½ Moly.
- Low Carbon, 1 Moly.
- ½ Cr., ½ Moly.
- 1¼ Cr., ½ Moly.
- 2 Cr., ½ Moly.
- 2 Cr., ½ Moly., 1¼ Sil.
- 2¼ Cr., 1 Moly.
- 2½ Cr., ½ Moly., ¾ Sil.
- 3-Cr., ½ Moly., 1¼ Sil.
- 3-Cr., 1 Moly.
- 5-Cr., ½ Moly.
- 5 Cr., ½ Moly., 1½ Sil.
- 5 Cr., ½ Moly., Titanium
- 5 Cr., ½ Moly., Columbium
- 7 Cr., ½ Moly.
- 8 Cr., 1 Moly.
- 9 Cr., 1 Moly.
- 12 Cr., Aluminum.
- 17 Cr.
- 18-8
- 18-8 Titanium
- 18-8 Columbium.
- 18-8 Molybdenum.
- 25-20

SEAMLESS WITHOUT WELDS

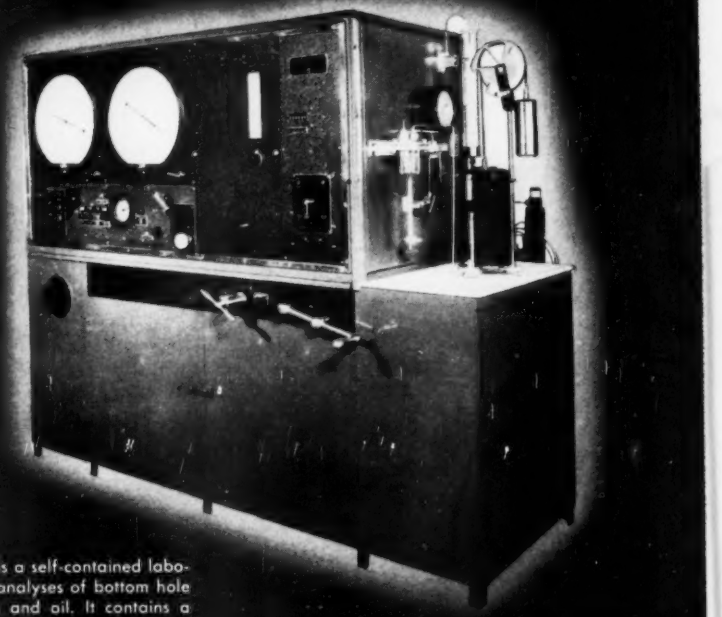
USS

NATIONAL SEAMLESS PIPE AND TUBES

UNITED STATES STEEL

SELF-CONTAINED LABORATORY

For Complete Physical Analysis of
BOTTOM HOLE OR SEPARATOR SAMPLES OF GAS AND OIL



This Reservoir Fluid Analyzer is a self-contained laboratory for complete physical analyses of bottom hole or separator samples of gas and oil. It contains a motor-driven variable volume cell, magnetic circulating pump, viscometer, gasometer, and thermal recombination cell. It operates at working pressure of 7,500 psi and temperatures up to 350° F.

Semi-automatic operation enables single operator to obtain data for the following: PV relation, saturation pressure, solubility and shrinkage for flash or differential liberation, viscosity, thermal expansion and compressibility of liquid phases, and compressibility of gas fractions. Complete run can be made in one to two days depending on maximum pressure and steps required.

Write for Complete Information

OTHER CIMCO RESERVOIR ENGINEERING APPARATUS

- Bottom Hole Pressure Gages
- Chart Measuring Microscope
- Sonic Fluid Level Meter
- Bottom Hole Sampler
- Viscometer-Roller Ball Bearing
- Variable Volume Cell
- Gasometer
- Volumetric Mercury Pump
- Transfer Bombs—10,000 psi.
- Petroleum Reservoir Analyzer
- Double Mercury Pump
- Magnetic Circulating Pump
- High Pressure Pump
- Thermal Compressor
- High Pressure Picnometer
- Precision Balance
- High Pressure Valves and Fittings
- Well Weighers
- Dead Weight Testers
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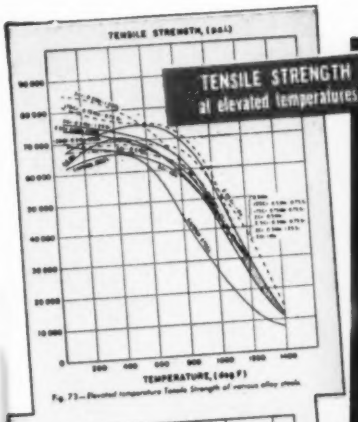
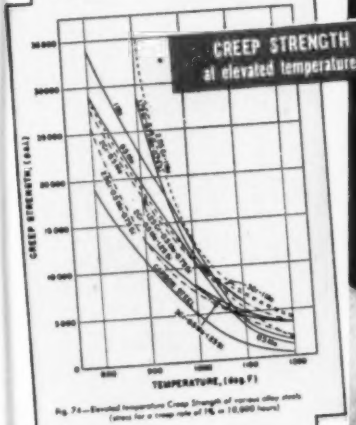
The low-down on alloy steels



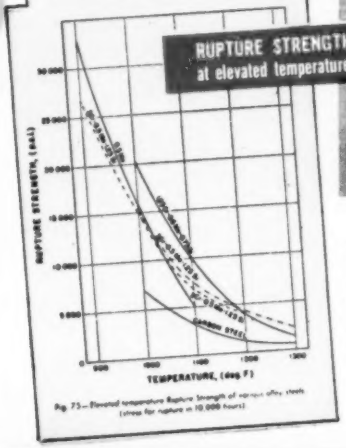
TENSILE STRENGTH at elevated temperatures

Fig. 73—Elevated temperature Tensile Strength of various alloy steels



CREEP STRENGTH at elevated temperatures

Fig. 74—Elevated temperature Creep Strength of various alloy steels (stress for a creep rate of 1% in 10,000 hours)



RUPTURE STRENGTH at elevated temperatures

Fig. 75—Elevated temperature Rupture Strength of various alloy steels (stress for rupture in 10,000 hours)

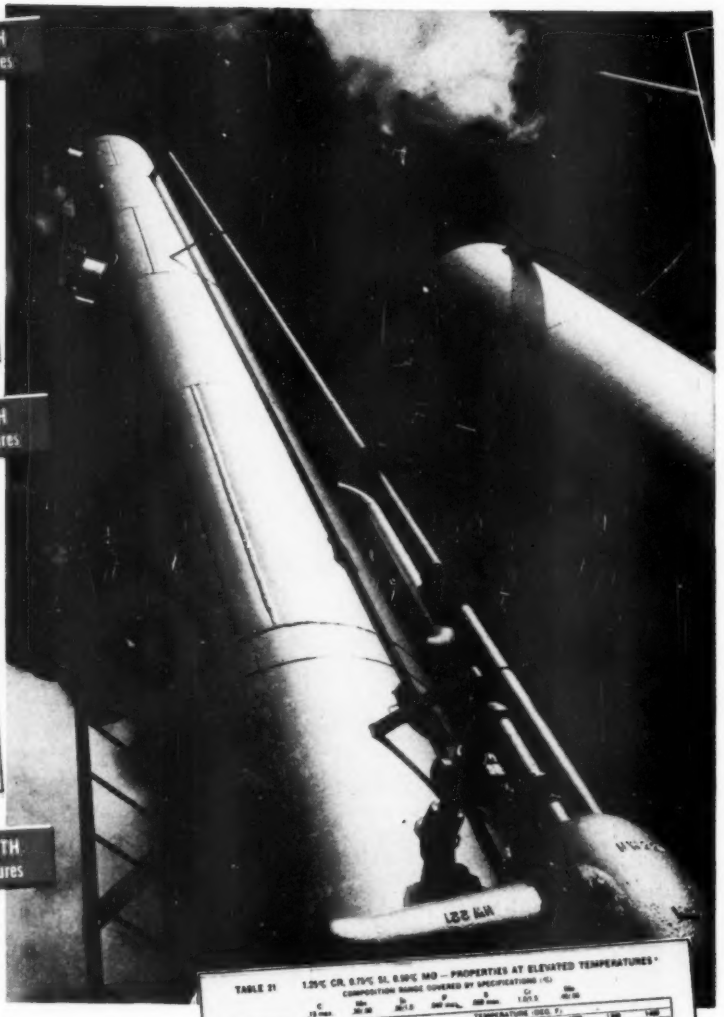


TABLE 21 1.25% CR, 0.75% SI, 0.50% MO — PROPERTIES AT ELEVATED TEMPERATURES*

COMPOSITION RANGE COVERED BY SPECIFICATIONS (%)

C	Mn	Si	P	S	Cr	Mo
15 max	30/.60	50/1.0	.040 max.	.040 max.	1.0/1.5	.40/.60

PROPERTY	TEMPERATURE (DEG. F.) 100	500	600	800	1000	1100	1200	1300	1400
ASME MAXIMUM ALLOWABLE STRESS (1000 psi)	15.0 (20.0-24.0)	11.8 (18-22)	10.9 (14-17.5)	5.65 (14-17.5)	2.2 (10-12.5)	(7-10.5)	(3-5)	(1.7-2.5)	(1-1.5)
TENSILE STRENGTH (1000 psi)	70	70	66	66	60	50	30	15	7
YIELD STRENGTH (1000 psi)		32.5 (28-36.5)	31.5 (26.5-33.5)	29 (24.5-31.5)	27.5 (22-33.5)	25	17.5	11	7
ELONGATION (% in 2")		30 (25-30)	30 (24-28)	29 (20-27)	29 (19-41)	(30-40)	40	70	70
REDUCTION OF AREA (%)		60	58	56	60.5	59	64	66	
CREEP STRENGTH 1% in 10,000 hours (1000 psi)		20 (20-28)	13 (17-25)	4.5 (10-22.5)	2.2 (3.5-7.5)	1.0	(1.5-3.5)		
CREEP STRENGTH 1% in 100,000 hours (1000 psi)		20.5	14.5	5.5	3.5 (2-4.5)	2	(0.8-2)		
RUPTURE STRENGTH 10,000 hours (1000 psi)						10.0	5	2.5	0.5
RUPTURE STRENGTH 10,000 hours (1000 psi)							5	1.2	0.4
OXIDATION (Weight loss in grams per square inch after 100 hours in air at the indicated temperature)	nil	nil	nil	nil	nil	34	69	110	1.19
LINEAR THERMAL EXPANSION (inches per foot — from 70° F to the indicated temperature)				5.65		7.07		7.70	

* Values in parentheses show spread of available data, and accompanying single values are a comparative average of the data. Single values only represent limited data.

These are a few of the informative charts included in the 18-page section devoted to High Temperature Steels in our new Carilloy handbook. A copy will be sent you on request.

for high temperature service

If you are building oil stills or cracking units, pressure tanks, steam turbines, boilers, superheaters, pumps, valves and piping, that must operate under high heat and high pressure—*we can help you.*

To obtain better yields, greater speed, and lower production costs, industry in recent years has been forced to higher and higher temperatures and pressures.

For that reason factual data on the behavior of steel under stress at elevated temperatures is of prime importance. Particularly is this so because, at high temperatures, steel flows or "creeps" continuously under operating stresses. This behavior can have disconcerting effects unless the designer has the proper information to guide him in his selection of steel.

That is why for years we have concentrated on digging out the facts about steel behavior at high temperatures. And because the "long-time" creep test is the most significant, our research laboratories have conducted literally thousands of such tests, many of them running into hundreds or even thousands of hours.

The results obtained have shown us not only how to avoid failures at elevated temperatures but have led to the development of new and stronger steels for such operation.

The U·S·S Carilloy Steels recommended for high temperature applications have a demonstrated high resistance to creep. They maintain strength at high heat. They can be heat treated to develop optimum properties. In addition they offer a wide flexibility in selection so that the qualities desired can be secured to whatever extent called for by the design. To assist you in their most economical application, the cooperation of our metallurgists, who played a major part in developing these steels, is freely at your service.

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COLUMBIA STEEL COMPANY, SAN FRANCISCO
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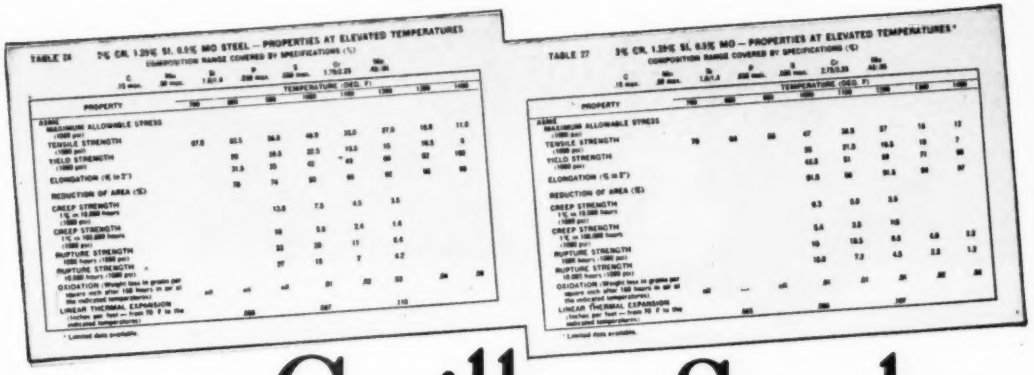
TABLE 26 3% CR, 1.25% SI, 0.5% MO STEEL — PROPERTIES AT ELEVATED TEMPERATURES

COMPOSITION RANGE COVERED BY SPECIFICATIONS (%)

PROPERTY	TEMPERATURE (DEG. F)								
	700	800	900	1000	1100	1200	1300	1400	1500
ASME MAXIMUM ALLOWABLE STRESS (1000 psi)									
TENSILE STRENGTH (1000 psi)	87.5	83.5	56.0	46.5	33.0	27.0	18.0	11.0	
YIELD STRENGTH (1000 psi)		80	35.5	22.5	13.5	15	16.5	8	
ELONGATION (% in 2")		31.5	33	42	49	69	82	100	
REDUCTION OF AREA (%)		78	74	80	88	92	96	98	
CREEP STRENGTH 1% in 10,000 hours (1000 psi)			13.0	7.5	4.5	2.5			
CREEP STRENGTH 1% in 100,000 hours (1000 psi)			10	5.0	2.5	1.4			
RUPTURE STRENGTH 1000 hours (1000 psi)			33	20	11	6.4			
RUPTURE STRENGTH 10,000 hours (1000 psi)			27	15	7	4.2			
OXIDATION (Weight loss in grams per square inch after 168 hours in air at the indicated temperature)	nil	nil	nil	.01	.02	.03	.04	.06	
LINEAR THERMAL EXPANSION (inches per foot — from 70 F to the indicated temperature)			.006		.007		.110		

* Limited data available.

TABLE 27 3% CR, 1.25% SI, 0.5% MO — PROPERTIES AT ELEVATED TEMPERATURES*

COMPOSITION RANGE COVERED BY SPECIFICATIONS (%)

PROPERTY	TEMPERATURE (DEG. F)								
	700	800	900	1000	1100	1200	1300	1400	1500
ASME MAXIMUM ALLOWABLE STRESS (1000 psi)									
TENSILE STRENGTH (1000 psi)	79	64	50	47	38.5	27	16	12	
YIELD STRENGTH (1000 psi)				30	21.5	16.5	10	7	
ELONGATION (% in 2")				42.5	51	69	71	98	
REDUCTION OF AREA (%)				81.5	86	91.5	94	97	
CREEP STRENGTH 1% in 10,000 hours (1000 psi)				9.3	5.0	3.5			
CREEP STRENGTH 1% in 100,000 hours (1000 psi)				5.4	3.0	1.9			
RUPTURE STRENGTH 1000 hours (1000 psi)				19	10.5	6.5	4.0	2.2	
RUPTURE STRENGTH 10,000 hours (1000 psi)				10.0	7.2	4.5	2.3	1.3	
OXIDATION (Weight loss in grams per square inch after 168 hours in air at the indicated temperature)	nil	—	nil	.01	.01	.01	.01	.01	
LINEAR THERMAL EXPANSION (inches per foot — from 70 F to the indicated temperature)			.005		.006		.107		

* Limited data available.

Carilloy Steels

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ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

UNITED STATES STEEL

THE OUTSTANDING WIRE ROPE FOR OIL MEN

THE ONE THAT LASTS LONGEST ...that's the most economical wire rope you can buy! And "Blue Center" Steel—made only by Roebling—gives wire rope that *extra-long* service life. With Roebling Preformed "Blue Center" you save dollars that really count.

To this, add the other advantages of Roebling Preformed wire rope. It's not inclined to twist and kink . . . is easy to handle and install. It can be cut without seizing. Broken wires stay flat and don't injure sheaves or drums.

You can have full confidence in Roebling rope . . . it is the accepted "standard" in industry today. There's a type and size of Roebling Preformed "Blue Center" Steel Wire Rope for every purpose. Have your Roebling Field Man recommend the best one for your requirements . . . and show you economical methods of installation and maintenance. John A. Roebling's Sons Company, Trenton 2, N. J.

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☆ *A CENTURY OF CONFIDENCE* ☆

CORROSION COSTS INDUSTRY

$6,000,000,000.00

ANNUALLY!

How much do you pay?

Don't risk needless waste

If all corrosion were as obvious as it is in steel pipe, industry would do more about it. But it is not. Often hidden or unnoticed – indoors and outdoors, above ground and below ground – corrosion takes its daily toll. Acids, alkalis, salts, gases and atmospheric conditions all are contributing factors. As a result, industry pays a terrific bill for corrosion – far more than it should. Your own cost, too, may be greater than necessary. Minimize your risk – do these two things now –

1. *Check up on your costs;*
2. *Provide adequate protection for danger points.*

Experienced and competent AMERCOAT engineers are available to help you on both. They'll check up on your costs, which may be greater than you know because the effects of corrosion are often hidden. They'll report on conditions as they find them. They'll recommend steps to take if greater protection can be provided and money saved. Inquiries from interested executives will receive prompt attention. There's no obligation – write today.

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AMERICAN PIPE AND CONSTRUCTION CO.
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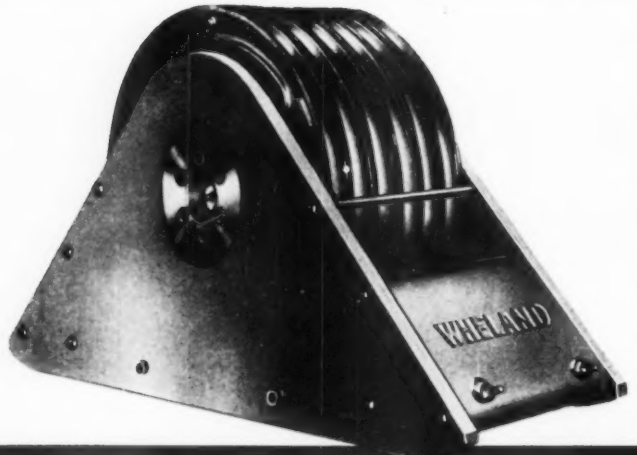

CROWN AND TRAVELING BLOCK FEATURES

- Statically balanced sheaves with Flame Hardened API Grooves.
- Large Diameter Double Row American Roller Bearings, designed for and exclusive with Wheland. Sealed Construction; Integral Thrust Shoulder.
- Individual Bearing Lubrication to Inner Race.
- Crown Block designed to be raised and installed in one load.
- Traveling Block fully streamlined, narrow, fast falling.

WHELAND CROWN *and* TRAVELING BLOCKS

"THE BEST BUY IN BLOCKS"

DESIGN, construction, appearance — everything is new in the Wheland Block Line. Note the compact Crown Block; can be raised and installed in one load — a real time saver in rigging up. Available in 250 and 350 ton capacities.

Fully streamlined Traveling Block is fast reeving, quick falling. Unusually stable because of low center of gravity. Four sizes: 60, 135, 250 and 350 ton.

Specially designed double row American Roller Bearings throughout, exclusive with Wheland. Individually lubricated; sealed construction; integral thrust shoulder. Sheaves are statically balanced, API standard, flame hardened.

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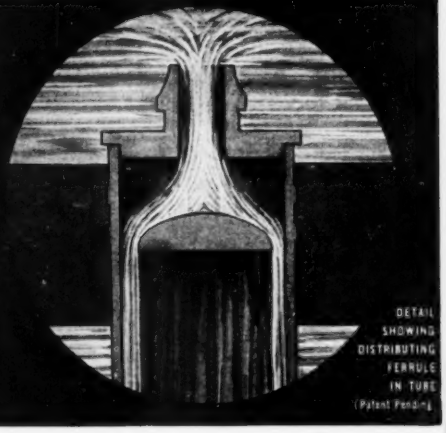
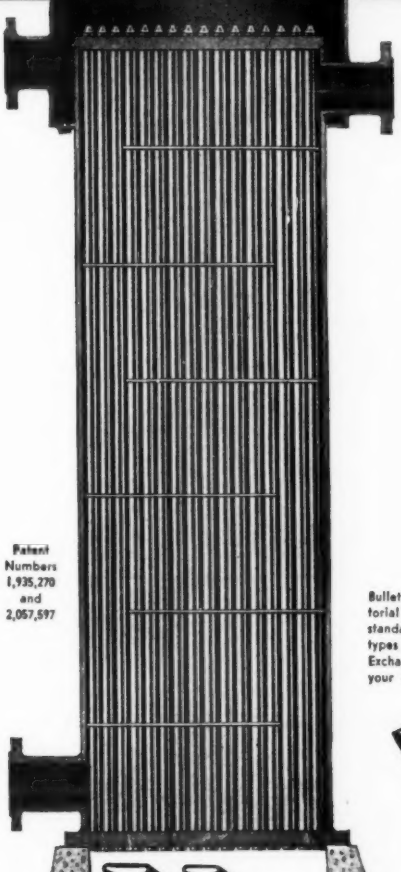
J&L STEEL

FILM TYPE EXCHANGERS



DETAIL SHOWING DISTRIBUTING FERRULE IN TUBE (Patent Pending)



Patent Numbers 1,935,270 and 2,057,597

Vogt engineers have taken a familiar refrigeration plant "old timer" and developed it into this modern, efficient heat exchanger.

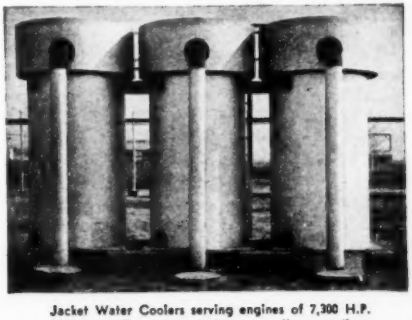
The film type exchanger operates in a vertical position. Water introduced in the top chamber is distributed in a thin film against the inner tube walls by means of special ferrules. The shell side of the exchanger has baffles arranged to provide optimum velocities, pressure drops, and heat transfer rates. Shutdowns are eliminated because tubes can be cleaned while the unit is in operation; thus permitting the use of dirty, mud and silt depositing water.

Vogt Film Type Exchangers now serve as Jacket Water Coolers, Sulphuric Acid Coolers, and Sulphur Dioxide Condensers, and can be designed to condense any vapor. They are also applicable for handling liquids other than water in film flow.

HENRY VOGT MACHINE CO., INC.
LOUISVILLE 10, KENTUCKY

Branch Offices: New York, Philadelphia, Cleveland, Chicago, St. Louis, Dallas

Bulletin HE-5 is a pictorial presentation of standard and special types of Vogt Heat Exchangers. Write for your copy.



Jacket Water Coolers serving engines of 7,300 H.P. Muddy well water used as cooling medium.

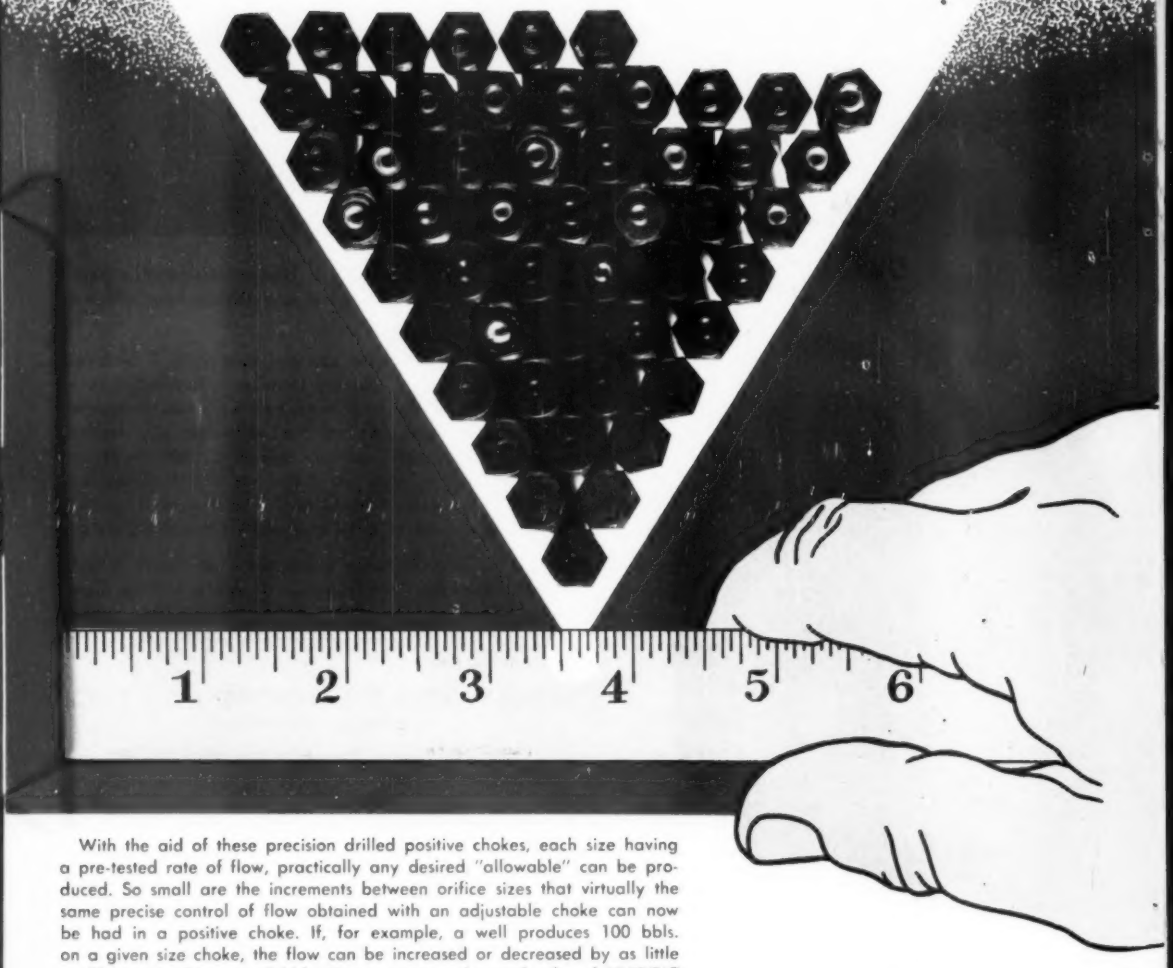
Vogt

HEAT TRANSFER EQUIPMENT

IN LESS THAN 3/16 OF ONE INCH,

there are 51 sizes of accurately drilled and flow-rated UNIBOLT positive choke inserts

73 SIZES UP TO ½"



With the aid of these precision drilled positive chokes, each size having a pre-tested rate of flow, practically any desired "allowable" can be produced. So small are the increments between orifice sizes that virtually the same precise control of flow obtained with an adjustable choke can now be had in a positive choke. If, for example, a well produces 100 bbls. on a given size choke, the flow can be increased or decreased by as little as 5%, or, in this case, 5 bbls. Many operators have also found UNIBOLT "X" BEANS helpful in establishing a favorable oil/gas ratio in high ratio wells.

UNIBOLT "X" BEANS are available as economical inserts in sizes up to X-41 (12/64); larger sizes being standard length, full drilled. They are hardened to resist cutting and are available in high chrome alloy for unusually corrosive conditions.

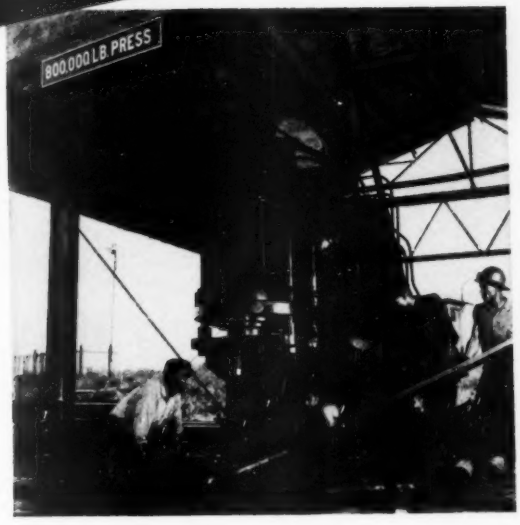
Unibolt enables you to select a positive choke size in rates of flow rather than in fractions of an inch.

THORNHILL-CRAVER CO.
HOUSTON, TEXAS

UNIBOLT "X" BEANS

AVONDALE

has the tools...



TO SAVE YOU MONEY ON MARINE REPAIRS

You, IN THE OIL INDUSTRY, know the importance of the right tools for the right job! It is the same with marine repairs—the right tools for the job can save more time and more money. Take, for instance the 800,000 lb. press shown above. . . . AVONDALE'S other special tools include rollers, plate brakers, lathes and many others. These, plus AVONDALE'S 24-hour machine shop service, can save YOU money on all types of marine repairs—no matter how large or how small. Call AVONDALE, consult our experts—get our estimate on your job.

AVONDALE MARINE WAYS, INC.

RIVER FRONT, MAILING ADDRESS: NEW ORLEANS DISTRICT WESTWEGO, LOUISIANA

MAIN PLANT: AVONDALE, LA.
QUICK REPAIR PLANT — HARVEY, LA.

Pittsburgh Seamless Still Tubes

Are Precision Made to Give You Uniform Performance with Economy

After precision threading still tube ends are checked carefully by specially trained inspectors such as John Gibson.

P

Modern cracking stills frequently require that the ends of still tubes are accurately machined to precise dimensions. The design varies with the type of fittings used. Shown above is a highly specialized type of alloy still tube end used by one of the major oil companies calling for a straight special type precision thread. Homer Bruckner is the operator.

The uniform resistance to heat, pressure, oxidation and corrosion you get with Pittsburgh Seamless Still Tubes is the result of years of experience and skill in making high quality tubes. Refinery operators everywhere find this uniformity makes for ease of installation and long operation which gives them the economical performance that keeps their costs down — their production up.

Pittsburgh Seamless Still Tubes are made in a wide range of analyses ranging from low molybdenum and intermediate chrome-molybdenum alloys to the higher grades thus making it possible for you to select the most economical grade for the creep strength or corrosion resistance you desire. Pittsburgh Still Tubes are available in sizes from 2″ to 6″ outside diameter (in some cases even larger) and from .134″ to 1″ average wall thickness in lengths up to 55′ with plain, upset or machined ends. To get uniform still tube performance with economy ask our metallurgical engineers to help you select the proper tubes for your next installation. Write Pittsburgh Steel Co., Dept. OG, Grant Building, Pittsburgh 30, Pa.

Pittsburgh Steel Company

Keeping the Navy "*Ship Shape*" with the Dempster-Dumpster . .

Shipyards, stations, and the men in Uncle Sam's Navy set a standard of cleanliness that is unsurpassed. Helping to maintain this high standard of Navy cleanliness is the Dempster-Dumpster System of materials handling . . . a system of quick pick-up of preloaded containers for hauling, dumping or moving materials.

Exactly 10 years ago the Navy purchased its first Dempster-Dumpster equipment . . . one truck hoisting unit with several containers. Now there are dozens of hoisting units and thousands of Dempster-Dumpster containers of many types at work keeping Navy yards and stations "ship shape." The sturdy steel foolproof and fireproof containers are placed at various places, such as barracks, mess halls, the docks and ship yards, wherever materials (solids or liquids) need be deposited immediately as they accumulate. A Dempster-Dumpster truck hoisting unit quickly picks-up each container when it is filled and hauls it to the disposal area. Contents are automatically dumped and container returned.

If you have a materials handling problem demanding more cleanliness, more economy, and more efficiency, it will pay you to investigate the Dempster-Dumpster System—popularly used, not only by the armed forces, but by municipalities, leading industrial plants, and by large and small institutions of all kinds.

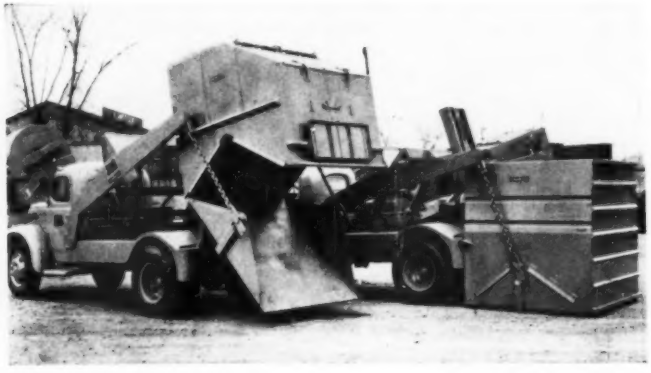
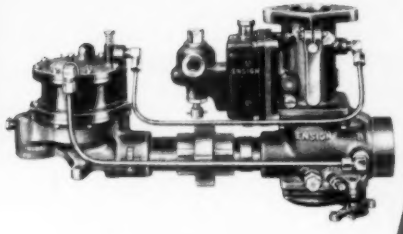


Photo above shows eleven hoisting units recently delivered to the U. S. Navy. Various types of containers are shown in carrying positions. Photo at left shows a hoisting unit preparing to lift a 10 cu. yd. Flat Top container, while another hoisting unit is dumping a 9 cu. yd. Trash and Rubbish Kolector type container. All controls of unit are conveniently located at the driver's seat. One driver and one truck handles any number of containers regardless of types.

DEMPSTER BROTHERS INC.

5109 Dempster Bldg.
KNOXVILLE 17, TENNESSEE

ENSIGN offers finest PRODUCT plus finest SERVICE



This Ensign Installation and Service Manual on Natural Gas and Butane-Propane Carburetion is available without charge to engine men.

SERVICE is a big word at Ensign's. Part of our responsibility, we feel, is keeping the ever-growing parade of oil field personnel well supplied with gas engine and carburetor information.

To do this we have produced a series of serviceman "helps" to better acquaint him with carburetion and gas engine problems. In separate bulletins combined into one Service Manual, each Ensign product is dealt with completely and simply from its principle of operation to servicing instructions including parts price list. All bulletins follow a standard format for easy reference.

To the engine builder and owner alike, Ensign service, slanted to the man in the field, means greater satisfaction and l... cost operation.

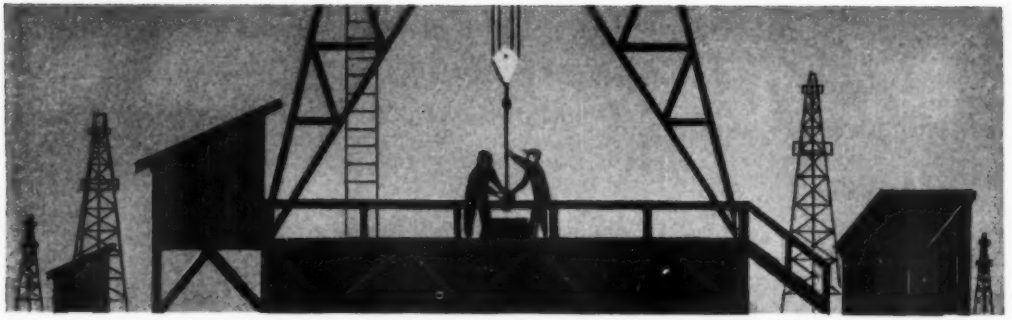
ENSIGN

CARBURETOR COMPANY

7010 S. ALAMEDA ST., P. O. BOX 339

HUNTINGTON PARK, CALIFORNIA

Branch Factory: 3230 West 35th Street, Chicago 32, Illinois



For **lumber** that has to LAST!

Use **penta**-chlorophenol treated wood!

Build for permanence with PENTAchlorophenol, the scientific, full strength wood preservative. Get positive, *tested* protection against decay and termites—protection, second to none, that lasts through the years. Reduce maintenance and rebuilding costs!

"PENTA" enables wood structures to withstand severe exposure—outdoor, underground and even under exceptional moisture conditions. It can be mixed with the proper oil solvent to permit painting after the wood has been treated. Workmen like PENTAchlorophenol-treated wood—it is clean and easy to handle.

Ask your lumber suppliers how you can take advantage of this modern wood treatment with its *deep penetration* and *measured control*. Or write to Dow for illustrated booklet No. PE 16A.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

DOW

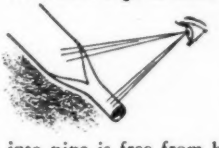
penta-
chlorophenol

AT THE TOP ON ALL 10 POINTS

Republic *Electric Weld* Line Pipe

bends readily at every rise and curve. High ductility steel—one of its ten outstanding qualities—makes field-bending simple and sure. Nine other equally valuable features give you additional ease of installation, plus trouble-free line performance. More than 51,000 miles of lines—carrying oil, gasoline, natural gas and by-products—have proved over the past twenty years that Republic Electric Weld Line Pipe is at the top on all 10 points:

1. **Uniform Roundness**—Pipe ends match up perfectly—speed construction—cut costs.
2. **Uniform Diameter**—No "off-size" lengths to cause welding difficulties at joints.
3. **Uniform Wall Thickness**—Absolute dependability throughout every inch of length and circumference.
4. **Uniform High Yield Strength**—Permits building of higher pressure lines—utilizing design values to fullest advantage.
5. **Uniformly Straight**—Lengths line up evenly—go into the ditch freely.
6. **Easy to Bend**—High-ductility steel makes bending in the field easy.
7. **Easy to Weld**—Low carbon steel welds readily—makes sound joints.
8. **Freedom from Scale**—Insures against clogged valves, contamination of petroleum products.
9. **Long Lengths**—Reduces number of joints—makes jobs move with longer strides.
10. **Inspected Inside and Out**—Republic Electric Weld Line Pipe is made from flat-rolled steel both sides of which are closely inspected. Thus, you are assured that the surface which becomes the inside wall when formed into pipe is free from hidden defects.



Write for literature.

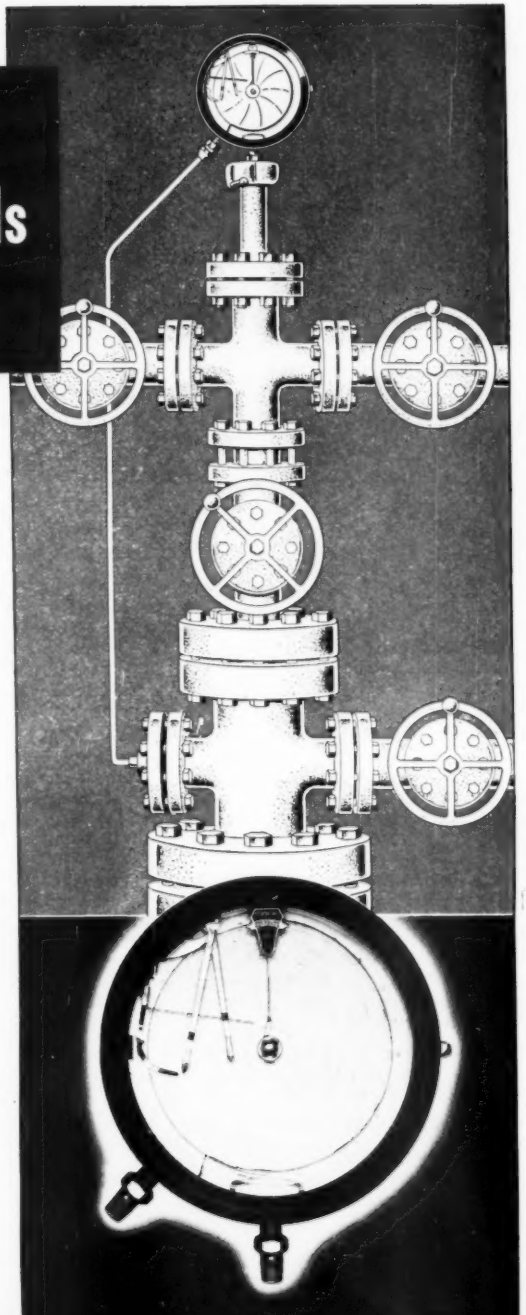
REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Dept.: Chrysler Bldg., New York 17, N.Y.

REPUBLIC STEEL

Republic ELECTRIC WELD LINE PIPE

Other Republic Products include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

KEEP ON TOP of Significant Trends in Rock Pressure



Continuous daily records of tubing and casing pressures show up gradual but significant trends in the life expectancy of your wells. With them, you can establish a more efficient program of your operations.

Foxboro Pressure Recorders are ideally suited for supplying this valuable information. Their dependable accuracy, typical of all Foxboro Instruments, is universally recognized throughout the industry. Their PLUS features have been added as a result of practical experience in the field.

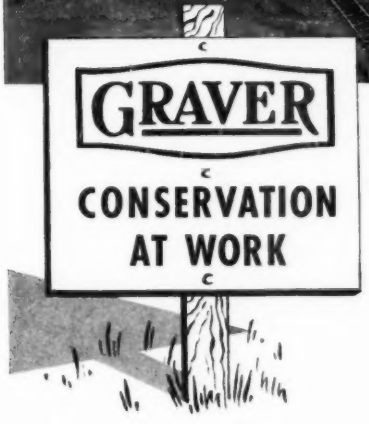
The range of these instruments can be easily changed by replacing pressure units as rock pressure drops off. Dual-range charts show both tubing and casing pressures. Two-speed chart-drives are available to provide a 7-day speed for normal operation and a 1-day speed for quick, close checking. Sturdy, round-case construction is weatherproof and designed to give sustained accuracy in spite of rough treatment.

Get all the details of these high-fidelity Tubing and Casing Pressure Recorders. Write for Bulletin 22A. **The Foxboro Company, 60 Neponset Ave., Foxboro, Mass., U.S.A.**

Standard ranges up to 10,000 psi; higher ranges, special. Single or multiple pen models.

FOXBORO
REG. U. S. PAT. OFF.

INSTRUMENTS FOR OIL PRODUCTION



Graver equipment at the Jones Island (Milwaukee) Terminal includes four cone roof tanks and an Expansion Roof Tank with a total capacity of 10,206,000 gallons.

at SHELL'S MILWAUKEE TERMINAL

• Safe gasoline storage and prevention of vapor losses are insured by the use of a Graver Expansion Roof Tank manifolded with four Graver Cone Roof Tanks at Shell's new marine terminal at Milwaukee.

This is Shell's largest postwar construction in a chain of new or expanded distribution centers and the importance of conservation is pointed up by the size of the operation. About 42,000,000 gallons of regular and premium gasolines, domestic heating oil, and prime white will pass through the terminal every year.

You are urged to inspect the economic advantages of the Graver Expansion Roof — its record of savings of salable products and its *proven* features of safety, positive action, and freedom from maintenance. For complete and convincing case histories, get in touch with Graver at once.

GRAVER

FABRICATED PLATE DIVISION

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

NEW YORK • PHILADELPHIA • CHICAGO • CATASAUQUA, PA. • HOUSTON • SAND SPRINGS, OKLA.

AMERICAN REPUBLICS CORPORATION DRIES RESIDUE GAS TO MINUS 10° F with ALCOA Activated Alumina

American Republics Corporation depends on ALCOA Activated* Alumina to dry residue gas at their Silsbee, Texas, gasoline plant.

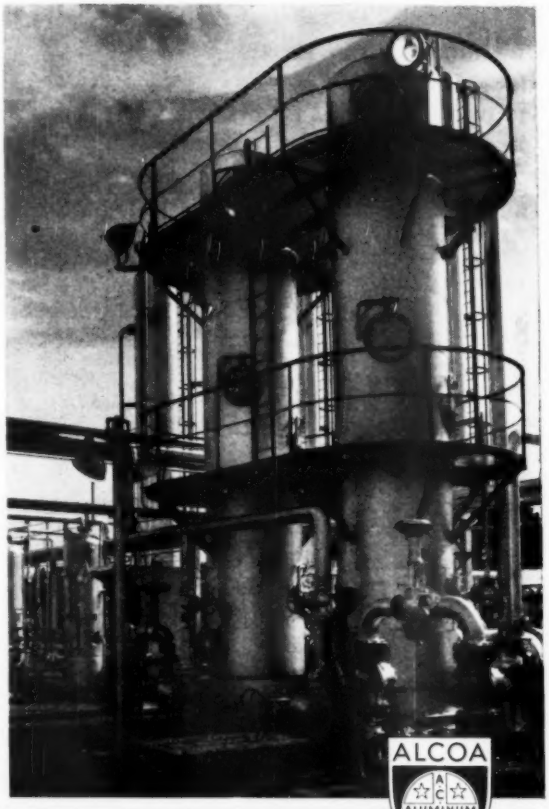
Each of the two dehydrating towers, illustrated, is charged with 16,000 lbs. of ALCOA Activated Alumina. Gas, entering the towers at approximately 100° F. and 900 psig, is dried to dew points not exceeding *minus* 10° F. Approximately 15,000,000 standard cubic feet of gas passes through the towers daily. Reactivation is accomplished with natural gas heated to 375° F.

ALCOA Activated Alumina was chosen for this installation because it is *dependable* and *economical*. It can be reactivated an almost unlimited number of times, without appreciable effect on its moisture adsorption efficiency.

ALCOA Activated Alumina will readily and repeatedly adsorb moisture from vapors and gases to dew points below *minus* 100° F. without changing its form or properties. It does not soften, swell, or disintegrate even when immersed in water. Furthermore ALCOA Activated Alumina is chemically inert to most gases and liquids, and is non-toxic.

ALCOA Activated Alumina is an efficient, long-lasting desiccant, for dehydrating to dew points even below *minus* 100° F. Let us send you complete information. ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 1967K Gulf Building, Pittsburgh 19, Pennsylvania.

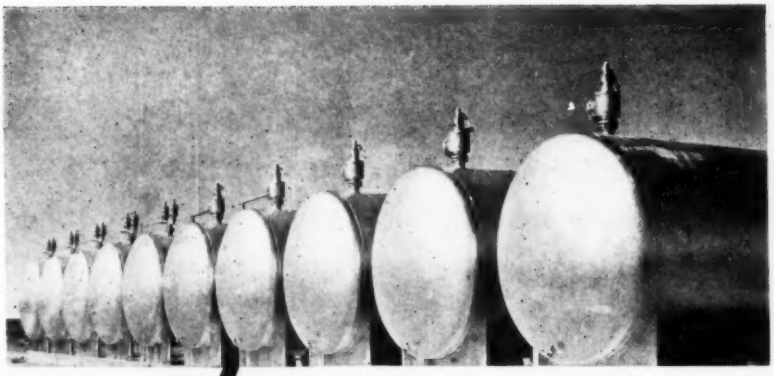
*Reg. T.M., Aluminum Company of America



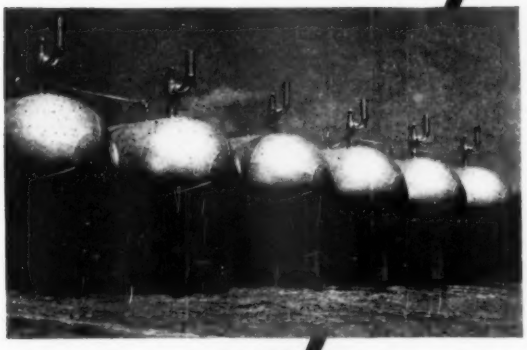
ALCOA CHEMICALS
ALUMINAS AND FLUORIDES

ACTIVATED ALUMINAS • CALCINED ALUMINAS • LOW SODA ALUMINAS • TABULAR ALUMINAS • HYDRATED ALUMINAS
ALUMINUM FLUORIDE • SODIUM FLUORIDE • SODIUM ACID FLUORIDE • FLUOBORIC ACID • CRYOLITE

Consolidated Safety Relief Valves on gasoline storage tanks.



Consolidated Safety Relief Valves on propane and butane storage tanks.



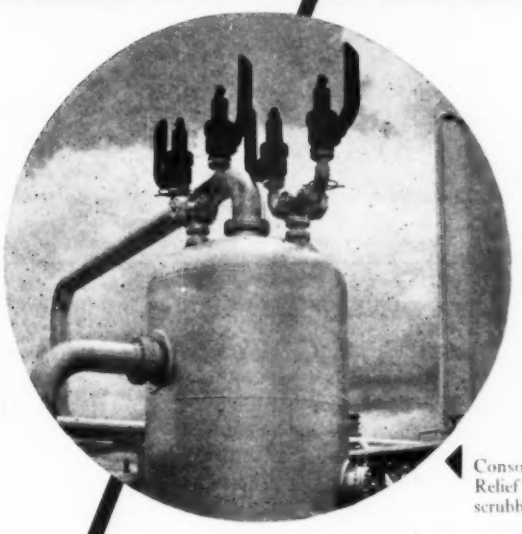
Safety plus Performance

CONSOLIDATED SAFETY RELIEF VALVES incorporate extra safeguards available *in no other valve*. The fixed capacity of these valves is *built in*, is not dependent upon the position of multiple and adjustable blow-down rings. A single adjustment controls blow-down only—without disturbing lift or secondary annular orifice areas.

Outside bevel seat and floating guide construction eliminate leakage under discharge piping stresses. Maximum tightness in all conditions of operation is assured.

With 25% fewer parts than ordinary valves and simplicity of design, maintenance is reduced and standardization problems minimized.

When you specify Consolidated Safety Relief Valves, you are assured of safety plus continued performance at rated capacity.



Consolidated Safety Relief Valves on main scrubber.

CONSOLIDATED SAFETY RELIEF VALVES

A Product of

MANNING, MAXWELL & MOORE, INC.
TULSA, OKLAHOMA

Makers of 'Consolidated' Safety and Relief Valves, 'American' Industrial and 'Microsen' Electrical Instruments, 'Hancock' Valves, 'Ashcroft' Gauges. Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load Lifter' Hoists, and other lifting specialties.

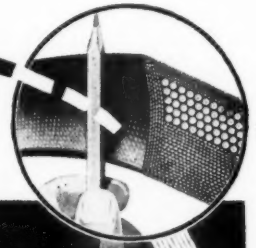
You can actually *feel* the sides of a belt *change shape* as the belt bends.

In Two Minutes You Can See Exactly How . . .

The Concave Side

(U.S. Patent No. 1813698)

SAVES Your Transmission DOLLARS



Take *any* V-belt in your hands and bend it as it bends in going around a pulley. You will see that the top of the belt, being under *tension*, grows *narrower*. The body, under compression, *widens*. The sides *bulge out*.

This shape change—in a *straight-sided* V-belt—is shown in Figures 1 and 1-A, below.

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove.

Now look at Figures 2 and 2-A. There you see how the *same shape change* affects the V-belt built with the precisely engineered *Concave Side* (U.S. Patent No. 1813698).

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit in Sheave Groove.

The top of the belt narrows, the body widens. But the sides *merely straighten—and* the new shape *exactly fits* the sheave groove!

Two savings result. (1) Uniform side-wall wear *—longer life!* (2) Full side-wall grip on the pulley carries heavier loads and *sudden load increases* without slipping; saves belts, saves *power!*

The Mark of SPECIALIZED Research

The Concave Side is *MORE IMPORTANT NOW Than Ever Before*

Because the sides of a V-Belt are what actually drive the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

Now that Gates SPECIALIZED Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

4910

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts

They Say—

Positive Approach

Sir:

Your article on "How Should You Use Geophysics" in the September 8 issue of The Oil and Gas Journal was extremely interesting to our company. . . .

In recent years both gravity and magnetics have been subjected to considerable criticism. Most of the criticism was largely based on a negative approach; that is, individuals for various reasons persisted in pointing out what gravity couldn't do. . . .

In our estimation the pendulum has swung back to a point where the oil industry is now primarily conscious of geophysical limitations and not of its benefits. This is a serious situation which has resulted from any number of factors, the most important of which we have mentioned above. Another reason is that numerous companies have tremendous amounts of gravity and magnetic data in the files with no interpretation. Geophysical data which has not been interpreted in geological terms is of little or no value. This is particularly true of gravity and magnetics. . . .

As the cost of exploration mounts per barrel recovery, exploration methods will be more closely scrutinized for effectiveness and efficiency. At that time the whole problem of exploration tools will be carefully examined and the result will be more complete exploration programs broadly entailing the principles outlined in your article.

In the meantime, if we are to find oil, a good suggestion would be not to constantly employ a negative approach to geophysics but to scientifically analyze the benefits which can be obtained by systematic exploration. This change must primarily take place in the minds of the men who utilize and interpret geophysical data. By employing such a constructive approach there is no question that oil reserves will be found that exceed even the most optimistic estimates.

L. L. Logue,
Exploration Surveys, Inc., Dallas.

Hometownism

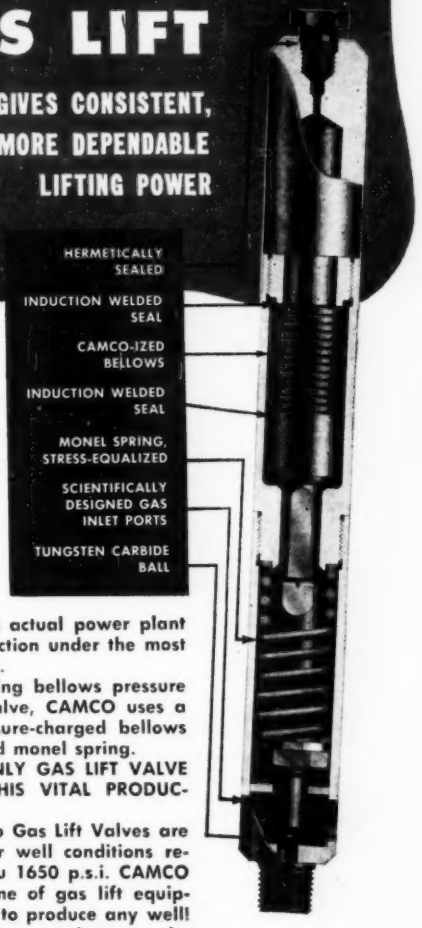
"The petroleum industry is growing constantly larger, but almost paradoxically as it becomes bigger, it is also becoming more community minded. It is doing business more increasingly on the local level basis.

"Hometownism is the essence of the appeal, of course, of the small oil company—producer, refiner or marketer. It is the one boiled-down char-

CAMCO

GAS LIFT

CAMCO-IZING GIVES CONSISTENT, MORE DEPENDABLE LIFTING POWER



CAMCO-IZING . . . an exclusive CAMCO process . . . is the only answer to consistent, dependable lifting power and economical gas-fluid ratios available in gas lift equipment today.

CAMCO-IZING preforms the valve bellows with 5,000 lbs. differential pressure. Thus, it tests while it conditions the valve's actual power plant for correct, positive action under the most severe well conditions.

And instead of using bellows pressure alone to close the valve, CAMCO uses a combination of pressure-charged bellows and a stress-equalized monel spring.

CAMCO IS THE ONLY GAS LIFT VALVE WHICH PROVIDES THIS VITAL PRODUCTION INSURANCE.

Hundreds of Camco Gas Lift Valves are installed today under well conditions requiring from 125 thru 1650 p.s.i. CAMCO makes a complete line of gas lift equipment . . . equipment to produce any well! Ask your Camco Representative or write Camco, Inc., 1108 Scanlan Bldg., Houston, for help with your production problems.

Your copy of the new Camco Catalog is now ready. Write for it today

CAMCO

GAS LIFT EQUIPMENT AND SERVICE

PRESSURE STORAGE TANKS
REQUIRE *dependable* ACCESSORIES

YOUR TANKS ARE SAFE WITH **"VAREC"** PROVED & APPROVED EQUIPMENT

The selection of reliable accessories for storage tanks becomes increasingly difficult when higher storage pressures are involved. For safety sake, each fitting must be engineered to your exact tank requirements—design, materials of construction and operation must all be considered very carefully.

"VAREC" Equipment offers you a selection of dependable accessories to do the many jobs required on your pressure storage tanks. Each has been designed for dependable and efficient operation. Each is available in materials to meet your pressure and corrosion problems. *Specify "VAREC" for all your tank accessories and be sure that your tanks are safe.*

CP-1

PROVED and APPROVED "Varec"

THE VAPOR RECOVERY SYSTEMS COMPANY
COMPTON, CALIFORNIA, U.S.A.
NEW YORK 50 CHURCH ST. PITTSBURGH 719 GULF BLDG. CHICAGO 122 SO. MICHIGAN AVE.
TULSA 409 TULOMA BLDG. HOUSTON 821A M. & M. BLDG.
CABLE ADDRESS: VAREC COMPTON (ALL CODES)

acteristic of the little fellow in the oil business.

"But this grass-roots importance has been coming into increasing recognition by large oil companies in recent times, and today is being accorded by far greater acknowledgment than ever before." *Keith Fansher, in The Chicago Journal of Commerce.*

New Price Base

"During the coming years we may witness a complete change in the pattern of the international flow of oil. The flow of oil across the Atlantic from west to east is likely to shrink; and the traffic from the United States to Europe should be replaced by traffic from the Middle East. The complex political situation may do much to retard development of a new price structure based on Middle East sources of supply and Middle East economic considerations. It may, however, take less long for the economic influences which affect the rapidly increasing home refineries of western Europe to play their part in the price considerations of refined products. This must surely lead to domestic prices which are not based on the United States." *Oil, published by the M.O.R. group of companies, London.*

Doing Its Part

"One thing is certain. If every factor for peace, progress, and human happiness were as assured as the future contribution toward those ends by the petroleum industry, our children and grandchildren could dwell each under his fig tree and 'none shall make them afraid.'" *Samuel B. Pettengill, in The Pure Oil News, Pure Oil Co.*

Great Opportunity

"As we meet today, we face a new period in automotive history. After several years longer of marking time than any of us anticipated, the era of normal, peacetime motoring has finally arrived.

"All of us, I believe, welcome this period, for we much prefer wrestling with the problems of better and more extensive service, than with those of shortages and of making not-enough go around. The days ahead, almost everyone will agree, bid fair to offer us the greatest opportunity the oil business has ever known." *Dayton P. Clark, chairman, A.P.I. lubrication committee, addressing Independent Oil Compounders Association in Chicago.*

Foreign Investment

"Ultimately what is needed is a climate conducive to large-scale investment of American capital. This climate cannot be created by the

United States alone. It will depend upon cordial and cooperative relations with the nations affected. American businessmen want some assurance that they will be able to withdraw their earnings and, if need be, their original investment in dollars. Such assurances can come only as a result of negotiations, and such negotiations are difficult." *Secretary of Commerce Charles Sawyer, address before the Propeller Club, Seattle.*

October

"To the poet.—The beauty of October is brought by death. Flowers, leaves, and grass . . . their dead bodies changing from green to gold . . . give to autumn a colorful display that inspires painters and poets into producing artistic masterpieces that live through the ages.

"To the scientist.—The month following the autumnal equinox in the north temperate zone generally means that atmospheric conditions preclude continued life in certain flora.

"To the safety man.—Both the poet and the scientist are right. October is a beautiful month, but the dead vegetation (the scientist's 'flora') creates a fire hazard. This is the time to protect all property from the hazards of grass fires." *Sinclair Safety Service, Sinclair Oil & Gas Co.*

Canada's Potential

"Proved reserves, as has already been noted, stand today at a billion barrels. And as for the potential—it is believed that the surface has scarcely been scratched.

"Some idea of its scope may be gleaned from the significant fact that the promising territory is larger than that of the United States' five leading oil producing states—Texas, Oklahoma, Louisiana, California, and Kansas—combined. Ultimate discoveries from this vast area will probably exceed 10 billion barrels." *Merrill Dennison, in The Lamp, Standard Oil Co. (N. J.).*

Dakota Potential

"A study of regional conditions following the discovery of enormous reserves of oil and gas in the province of Alberta, Canada, has led to recognition of the fact that the Devonian formations, which produce in Alberta, extend through Saskatchewan and into North Dakota." *T. M. Martin, president of Lion Oil Co.*

How They Died

"Statistics show that of 4,076 people who died of gas last year, 29 inhaled it, 47 put a match to it, and 4,000 stepped on it." *Panhandle Lines, Panhandle Eastern Pipe Line Co.*

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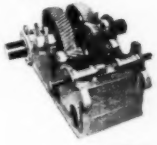

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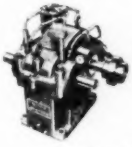

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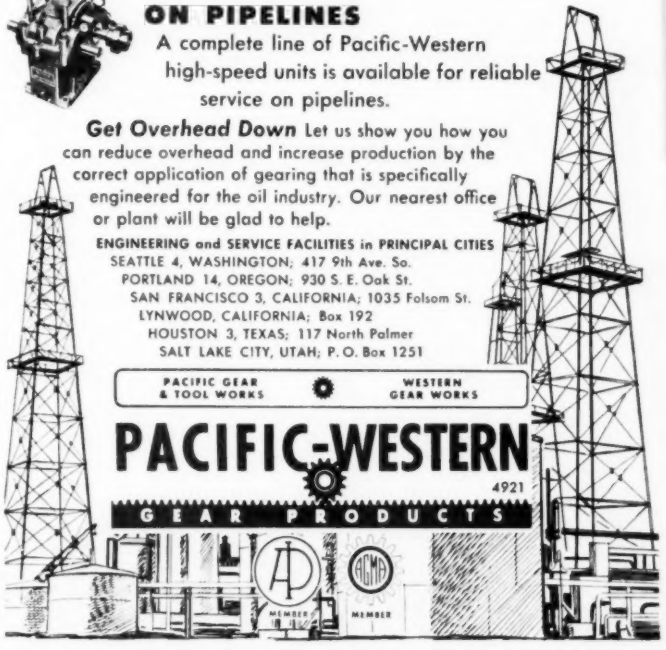

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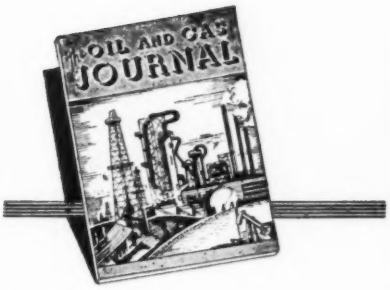

Published every Thursday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Okla. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

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JOURNALLY Speaking

Autumn Pastime

THE Tulsa Oilers won the Texas League pennant but lost the Dixie Series to Nashville. The Yanks and Dodgers have settled a little intracity squabble they chose to call the World Series. The whir of the pigskin is heard throughout the land as the grid-iron dopesters figure out who is going to win next Saturday's intercollegiate classic.

It's fall, and when the leaves begin to turn, oil men have an irresistible urge to convene and talk shop with their fellows. And when they do, our leg men try to be there to listen in and make reports for the benefit of you stay-at-homes. They've been convening all over the landscape recently, and it has just about worn our staff—and the expense account—ragged trying to keep up with them. Sometimes we don't have space to print much else, but we figure that oil men must like to read about conventions because they go to so many.

Right now we're getting our second wind to be ready for the super-duper of all oil meetings—the A.P.I. in Chicago—and we plan to report it in a super-duper issue November 10. When you see it you'll understand why we haven't been absorbing as much of this nice October sunshine as we'd like to.

Hobby Lobby

FRANK W. McCURRY, vice president in charge of manufacturing of Derby Oil Co., Wichita, has what he calls the "World's Greatest Oil Hobby." He has fashioned an elaborate display of glass working models illustrating the origin of crude oil, methods of exploration, drilling and producing wells, pipe-line transportation, refining operations, and physical and chemical properties of oil. And, like all hobbyists, he has a lecture which he will deliver at the drop of a hat to anyone who will listen.

Last week Mac flew the whole shebang to the convention of the American Society for Testing Materials in San Francisco to help the A.S.T.M.-ers celebrate Oil Progress Week.

We wonder if this enterprise ought not to be called the "World's Greatest Oil Lobby" instead of hobby. For if more people in the oil industry took more time to educate more people outside the oil industry about what goes on inside the oil industry, the oil industry would not have to have so many people in the lobbies of the nation's legislative bodies to educate the lawmakers against passing laws which would prevent the industry from running as smoothly as it does in McCurry's glass model.

Immaterial

VIEWERS with alarm might view with alarm the fact that this month the American Society for Testing Materials is holding symposiums on the future of nuclear power and solar heating.

If these two things really get to going, what they might do to the oil industry shouldn't happen to a dog. But we refuse to get perturbed yet, and shall confine our lyings-awake to worrying over the threat of synthetic oil from coal, confident that the A.S.T.M. won't ask for several billion dollars to set up plants to compete with the oil industry.

We might, however, raise the mild technical objection that A.S.T.M. is getting out of its jurisdiction, because since when are solar radiation and nuclear fisson "materials"?

Solid Granite

IN Monroe County, Michigan, according to a scout report, a rank wildcat has been drilling in solid granite for 4 years and is still drilling at 5,139 ft. after topping granite at 3,625 ft. History records other instances of drilling a couple of thousand feet through granite, but in most cases it was found that the operator's head was made of the same material.

—*Henry D. Ralph*

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VOL. 48. NO. 24 OCTOBER 20, 1949

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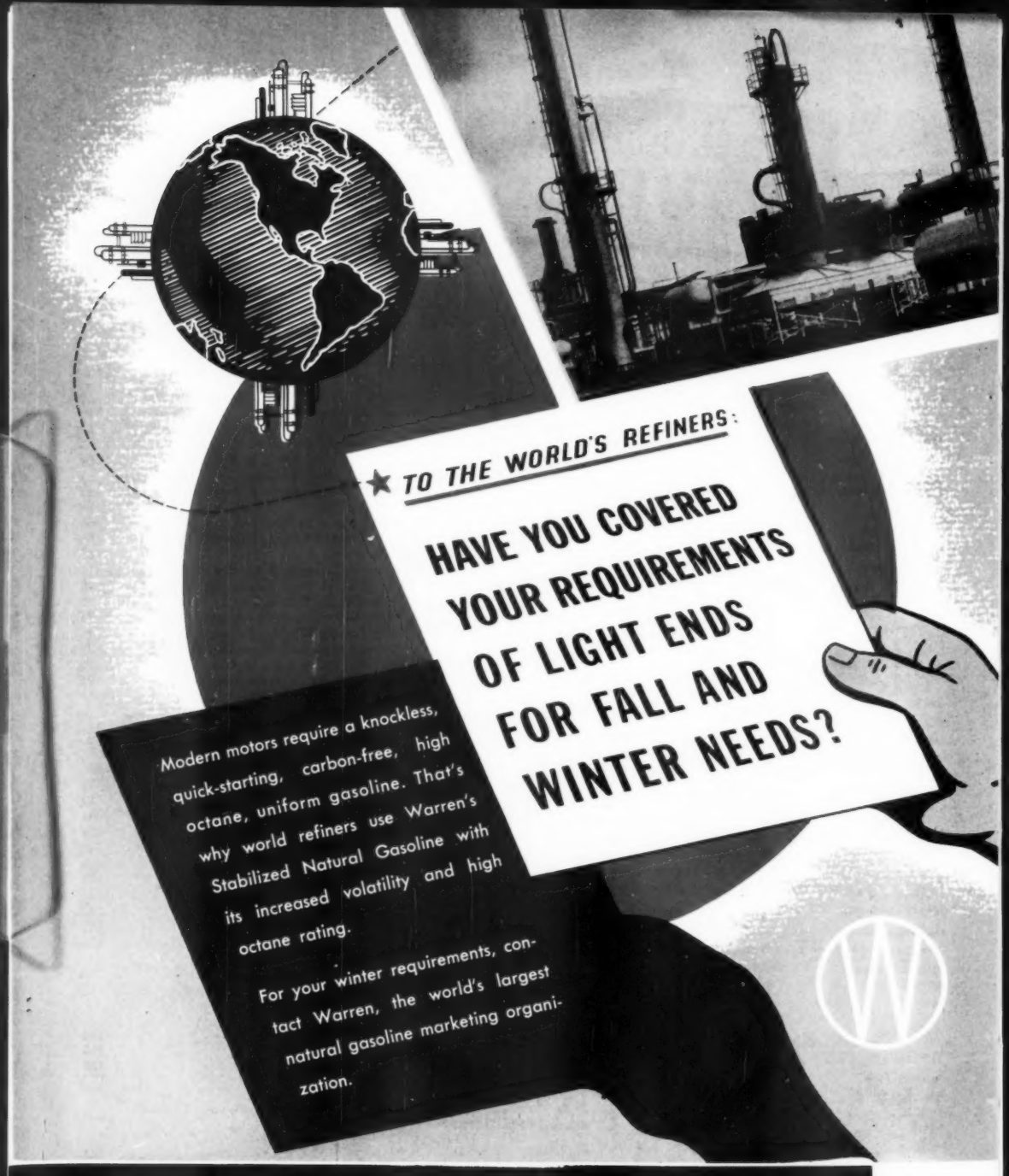
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Crude Oil, Natural Gasoline and Liquefied Petroleum Products

THE OIL AND GAS JOURNAL

Hold Your Horses

THE pessimism which pervaded the oil industry last spring has given way to rather general optimism, but some of the industry's more serious students are whispering words of caution against letting this optimism get out of bounds.

There is no doubt that the industry is in much better shape than it was a few months ago. The production of crude was brought down to a reasonable relationship with current market demands without a cut in the price of crude and without serious hardship on most producers and refiners.

Recently the market has stiffened and the demand outlook improved. Drilling has held up even better than many had anticipated and is showing signs of increasing, refinery runs have turned upward, and stocks of refined products are not excessive.

These are all plus signs, and genuine ones. Business is better. But it is not enough better to warrant the assumption that it will continue to improve during the next 6 or 12 months as rapidly as it has improved during the last few weeks. There are warning signs which suggest that the advance may be slowed considerably.

One of these is crude stocks. Their decline seems to be about halted and to be more than offset by recent increases in crude production. In three successive months the increases in Texas allowables have wiped out nearly half of the curtailments of the previous eight, and in some other producing areas the lid has been lifted to an even greater degree. But last week refinery runs dropped 45,000 bbl. per day below the September average. If this straw points a shift in the wind it could result in an upturn in crude stocks, which would constitute a warning that production should be held down until demand again overtakes it.

There is very little prospect that imports of crude will decline, but rather there are indications that they will increase somewhat.

The increase in demand for petroleum products so far this fall has been a little short of most forecasts, and it should be kept in mind that a considerable portion of this increase represents deficiencies of previous periods when consumers should have been stocking up with heating oils but did not.

Weather is a highly important factor, and the warm fall to date has prolonged the season of high gasoline consumption but has slowed sales of heating oils. If this presages another mild winter in the Northeast, the industry's planning may need drastic revision.

There are many indications that 1950 will see the oil industry moving into new high levels of activity, but not at a boom pace. There are grounds for optimism, but the optimism should be geared to reality and tempered with caution.

State Sovereignty Is Theme of Speakers at Industry Meeting

by Leigh S. McCaslin, Jr.

HOUSTON.—"The Interstate Oil Compact has shown such efficient stewardship in the conservation of a vital natural resource, that our Congress should at all times stand ready in the future, as in has in the past, to preserve state sovereignty in the conservation of oil."

These words by Gov. Frank Carlson of Kansas struck the keynote for the Texas Mid-Continent Oil and Gas Association's meeting in Houston last week.

He was followed by nine other speakers, most of whom made reference to the advantages of state sovereignty and free enterprise over the "welfare state" proposed by some in government. The precarious condition of the English economy was pointed to as ample evidence that a free welfare state cannot succeed.

Carlson strengthened his commendation of the compact by pointing to these accomplishments under state regulation: The United States was able to produce 60 per cent more oil per day per thousand barrels of reserves in World War II than in World War I; oil reserves have continuously increased; the United States furnished the oil, without which World War II would have been lost; production is limited to consumption and operating requirements, and waste of aboveground storage held to a minimum; and gasoline is still the cheapest major product relative to former prices.

Strong applause greeted the Kansas governor's extemporaneous remark that the Senate had just rejected the appointment of Leland Olds as a member of the Federal Power Commission. Carlson commended Texas for "the strenuous efforts put forth by your state officals to maintain the right of your state to its submerged lands."

An authority on petroleum's role in military operations, Lt. Gen. LeRoy Lutes, commander of the Fourth Army, provided a word picture of the industry's job in the event World War III should erupt.

"Every Drop Required"

"The minimum requirements of another war will probably require every drop of petroleum products that the Western Hemisphere can produce," he said. "A certain degree of rationing would be possible, but its effect would be limited. . . . We would have to supply a large part of the needs of our Allies as well as our own. . . . Aviation gasoline will continue to be a problem. Large numbers of alkylation units may be required. . Emergency pipe lines probably would have to be constructed. . . Tanker construction also would be required. . The two items that appear to be most critical are steel and manpower."

General Lutes, who served until recently as director of staff of the Munitions Board, told the 400 oil men present that the military believes that "our domestic industry should be as strong as possible and that the industry in the Western Hemisphere should be healthy and vigorous." He asked for "a reasonable balance" between exports and imports. "Such a balance should be achieved without placing a penalty on United States producers," he said.

Dr. Robert E. Wilson, chairman of the board Standard Oil Co. (Ind.), Chicago, told his Houston audience that "More millions of dollars have been spent in research on the chemical reaction we term cracking than on any other in the history of the world and the benefits to our nation alone can only be measured in tens of billions"

The army man urged his audience to develop new reserves and provided an incentive with figures on estimated growth in demand. "It has been estimated that in 20 years our population will grow to about 164,000,000, with an indicated petroleum demand of 25 to 30 bbl. per capita against a per capita demand today of about 16 bbl.," he said.

Another lieutenant general—Ernest O. Thompson of the Texas Railroad Commission—preceded Lutes on the rostrum and assured his audience that the Texas oil industry has "the continued ability to meet any national emergency." In addition, he praised the work of the IOCC and the market-demand law of his state which limits production to demand.

Cracking History Cited

The history of cracking, described as the industry's most important conservation measure, was traced by Robert E. Wilson, chairman of the board of Standard Oil Co. (Ind.). He emphasized that the great social benefits of this process came from "the natural operation of the hope-for-profit incentive, teaming up with science and technology" rather than from "some fine central planning and ordering of our industry and our national economy."

Many improvements have been made since cracking was first developed in 1914, the famous scientist noted. "Even today," he declared, "the oil industry is spending tens of millions of dollars each year in re-

Lined up at the registration desk in the Rice Hotel are John F. Lynch, president, La Gloria Corp., Corpus Christi; Eugene McElvaney, vice president, First National Bank, Dallas; Walace Hawkins, attorney, Magnolia Petroleum Co., Dallas; Paul A. McDermott, attorney, Sinclair Oil & Gas Co., Fort Worth; and Charles A. Perlitz, vice president, Continental Oil Co., Houston

Talking informally before the opening session of the meeting are H. B. Fuqua, chairman of the board, Texas Pacific Coal & Oil Co., Fort Worth; H. E. Williams, independent operator, Houston; Frank M. Wood, independent operator, Wichita Falls; E. R. Filley, general manager, domestic-producing department, The Texas Co., Houston; and A. R. Wilson, assistant manager, domestic-producing department, The Texas Co., Houston

search and development on new and better methods of cracking and utilizing its byproducts." The most visible results to the public, he said, are probably the improvement in quality of gasoline from an octane rating of around 55 to around 80, and the development of byproducts such as synthetic rubber, plastics, ethyl alcohol, and permanent antifreezes.

Harold G. Moulton, president of the Brookings Inst itution, famed research and study center for economics and governmental affairs, gave an optimistic forecast of the country's future. "My intensive studies lead to the conclusion that we do possess resources adequate to permit a doubling of the population over the next century and an eight-fold rise in living standards," Moulton said, as he reviewed agricultural, mineral, and energy potentials of the nation.

The veteran analyst laid out four strong reasons why governmental control over economic life is impracticable in the United States: (1) The U. S. Government is not a unified lawmaking body; (2) There is divided responsibility between major divisions of government even within the executive branch itself; (3) Power is divided between federal, state, and local governments; and (4) Government economic policies reflect power and influence of many special-interest groups, and vote-getting becomes a primary consideration.

John M. Lovejoy, president of Seaboard Oil Co. of Delaware and chairman of the A.P.I.'s public-relations committee, asserted that the industry's public-relations activities provide a medium for all to do their part in preserving free enterprise. He emphasized that "Governments create nothing—everything they give to the people they must first take away from the people."

A prediction that Texas oil men will become "the industrial pacemakers of our time" was made by R. R. Anderson, Vernon, Tex., association president. On the subject of taxation Anderson cited estate and gift taxes as an example of federal encroachment on state fields for revenue raising.

Elected for a third term as president of the organization was R. B. Anderson, Vernon. Also reelected were Andrew M. Howsley, Albany, general counsel; Charles E. Simons, Dallas, vice president and general manager; and Eugene McElvaney, Dallas, treasurer. New directors include Harlan Ray, G. B. R. Oil Corp., Dallas; H. B. Zachry, Francitas Gas Co., San Antonio; Roy Derrick, King, Warren & Dye, Midland; John Hurd, Killam & Hurd, Laredo; and V. F. Harrison, Southern Minerals Corp., Corpus Christi.

In addition, a new slate of regional vice presidents was named. They are: E. L. Green, Jr., Cabot Carbon Co., Pampa; George W. Dimock, Akin & Dimock, Wichita Falls; French M. Robertson, Abilene; H. E. Chiles, Jr., Western Co., Midland; Raymond Dillard, J. K. Hughes Oil Co., Mexia; Watson W. Wise, Jackson, Wise & Snedden, Inc., Tyler; W. C. Morris, Allen & Morris, San Antonio; John F. Lynch, La Gloria Corp., Corpus Christi; Corbin J. Robertson, Quintana Petroleum Corp., Houston; and Scott Myers, Unity Oil Co., Beaumont.

Buchanan, McFarland Receive Awards

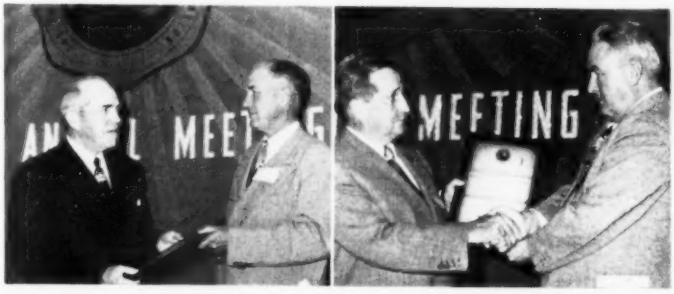
HOUSTON.—Al Buchanan, veteran oil-well drilling contractor of San Antonio, and Russell Scott McFarland, vice president of Seaboard Oil Co. of Delaware, Dallas, received the Texas Mid-Continent Oil and Gas Association's distinguished-service awards at last week's meeting here.

The annual awards for industry service were conferred during Thursday afternoon's session of the association's thirtieth annual meeting.

John Suman, vice president of Standard Oil Co. (N.J.), made the presentation of the plaque for the outstanding independent oil man to Buchanan, while Dr. J. C. Karcher, Dallas oil operator, presented McFarland with the award for the large-company recipient.

McFarland, who has been vice president and general manager of the Mid-Continent Division of Seaboard since 1931, was cited for his participation in association work and aid toward solution of industry problems.

Buchanan, a vice president of the association and prominent San Antonio and South Texas civic leader, is credited with discovering nine oil fields in Texas and has drilled more than 2,500 wells in the state. In a colorful career which began with pipeline work and roughnecking in North Texas oil fields about 1908, Buchanan became a drilling contractor, made booms in Oklahoma, Texas, Arkansas, Louisiana, Mississippi, and California and has drilled wildcats in Florida and Wyoming.



In left picture, R. S. McFarland is shown receiving his award from Dr. C. J. Karcher, Dallas oil operator. At right, John Suman, vice president of Standard Oil Co. (N. J.), presents the award to Al Buchanan, San Antonio drilling contractor

Oil Progress Week Gives Public Inside View of Oil Industry

THIS is Oil Progress Week, and throughout the nation oil men are showing their communities how their industry operates, reminding them of the improved living petroleum has brought, and preaching to them that competitive private enterprise is what has made the oil industry—and America—what it is.

They are doing this in a thousand ways, different in every town. There is no established pattern, and with their traditional ingenuity and independence the oil men developed their own programs as they saw fit.

A beauty contest in Omaha picked "Miss Oil Progress Week." A baker in Savannah presented "Ninetieth Birthday Cakes" to the city's filling stations. A movie truck in Atlanta showed oil-industry films to sidewalk audiences all over the city. All the school children in Grand Forks, N. D., were taken on an "Oil Progress Picnic."

It was "open house" everywhere. The public was invited to inspect refineries, pump stations, bulk plants, laboratories, oil tankers. Half a dozen new plants were formally dedicated with public ceremonies this week, including the world's largest catalytic cracker at Linden, N. J.

Not Confined to Oil Areas

But by no means was the observance confined to oil centers. Cities far removed from any production or refining participated just as enthusiastically. Service stations were decorated, and there were parades and exhibits, speeches and movies, in every part of the country.

Many of the smaller towns put on bigger shows than metropolitan centers. Great Bend, Kans., held a 3-day "Oil Progress Festival" in which the entire populace participated. Galesburg, Ill., staged an unusual parade portraying the history of transportation starting with a man on foot and progressing to petroleum-propelled vehicles. Dexter, Kans., dedicated a marker on the site of the world's first helium well.

The Kansas City Chamber of Commerce hired professional writers, actors, and musicians to dramatize the "Wizardry of Oil" as a variety show. The Horseless Carriage Club of St. Louis contributed a parade of ancient vehicles. New Orleans revived its mardi gras technique for a gala parade down Canal Street. In New Haven, Yale University professors lectured on the history and economics of petroleum.

The usual pattern was a luncheon for civic leaders addressed by some local dignitary or industry leader, and at least the nation's hotel managers and caterers were made aware of Oil Progress Week. The industry's oratorical talent was put to its fullest use, and literally hundreds of oil men unaccustomed to public speaking gave talks to civic clubs, school children, and on their local radio stations.

The press and radio cooperated with feature stories and interviews, and there were many special editions of newspapers and elaborate radio programs. Schools participated widely, and in several communities the local oil men sponsored essay contests among the children.

Several governors and hundreds of mayors issued "Oil Progress Week" proclamations, and many of them joined in the oratory. A typical attitude was that of Gov. Alfred E. Driscoll of New Jersey, whose proclamation began: "It is appropriate that an industry with a tremendous investment in New Jersey should report to the people of this state the progress it has made during the 90 years of its existence."

A report on the industry's progress was what Oil Progress Week was everywhere, and there was every indication that the public enjoyed and appreciated the report.

Union Oil Co. Purchases Los Nietos Co. in $40,000,000 West Coast Deal

LOS ANGELES.—Union Oil Co. has purchased Los Nietos Co., a family concern owned by the five grandchildren of Edward L. Doheny, famed California and international oil operator who died a few years ago.

Principal property of Los Nietos is a one-quarter interest in 1,325 acres of producing leases (2,000 total) in the Coalinga Nose pool, Fresno County, California. The purchase by Union is via contract to buy all the outstanding stock, 35,000 shares, in Los Nietos for a cash consideration of $22,400,000 plus 600,000 shares of Union Oil common stock. Present New York Stock Exchange price for Union Oil shares is about $28.50, so the total deal amounts to approximately $39,500,000.

The Coalinga Nose properties involved in this sale are among the richest in California, and for that matter in this country, as the thickness of clean productive oil sand runs to a maximum of 700 ft. near the center of the pool.

Last month the production due the Los Nietos interests from Coalinga and other properties purchased ran 7,800 bbl. per day. Other interests sold include proven leases and interests in the Pleasant Valley and Guijarral Hills pools, which are near Coalinga. Smaller productive holdings in the Kettleman pool of Fresno and King counties, California, and in West Texas and Alberta also are a part of the purchase.

Substantial quantities of untested acreage elsewhere in California and in the Rocky Mountain, Mid-Continent, and Alberta areas are additional items. Los Nietos also owns various real estate and improvements including an 11-story office building in downtown Los Angeles, numerous other properties and substantial working capital.

Estimates place the recoverable crude oil and hydrocarbons involved in the sale at 48,000,000 bbl. Los Nietos' net interest in production, deducting all interests of others, amounted to 2,300,000 bbl. in 1947, 2,536,000 bbl. in 1948, and 1,427,000 the first 7 months of 1949.

An almost parallel deal occurred in September of this year when Nassau Associates, Inc., New York, subsidiary of Dillon, Reed & Co., purchased Mrs. Carrie Estelle Doheny's similar one-quarter interest in the Coalinga Nose-Pleasant Valley-Guijarral Hills leases for $35,500,000 cash. An article describing the details of the Nassau-Mrs. Doheny transaction appeared in the Journal issue of September 29, 1949, page 40.

Union Oil Co. reportedly is negotiating a private loan from a group of insurance companies for $40,000,000, to draw 2.75 per cent interest and to mature November 1, 1974.

The company is said to plan to use this sum in part to retire $14,600,000 worth of 3 per cent debentures maturing at an earlier date. Union presumably will use another part of the financing to handle the Los Nietos purchase.

This crude-oil acquisition gives Union Oil a total of approximately 13,800 bbl. per day of new crude in the last month for its own account, with 7,800 bbl. coming from the Los Nietos purchase plus 6,000 bbl. that Union obtained through a long-term contract with Nassau Associates when that firm made the prior $35,500,000 deal with Mrs. Doheny for her Coalinga area lease interests.

this week

INTERNATIONAL—Daily production increase in Venezuela of 60,000 bbl. boosts total world output during August. . . . Domestic production also contributed to worldwide gain. . . . ¶Japan seeks first postwar bids on crude-oil supplies. . . . Terms, however, virtually bar United States suppliers. . . . ¶Mexican American Independent spuds first well under percentage contract with Petroleos Mexicanos. . . . Well is in gulf off Veracruz State. . . .

INDUSTRY—Preservation of state sovereignty in oil matters and action to halt trend toward a federal welfare state urged by speakers before Texas Mid-Continent Oil and Gas Association. . . . ¶Increased use of instrumentation in process control predicted by Phillips vice president in talk at Texas A. & M. instrument symposium. . . . ¶Revolutionary development in electric logging is described before joint regional meeting of A.A.P.G. and S.E.G. in Biloxi, Miss. . . . ¶Wide variety of activities mark Oil Progress Week throughout nation. . . . ¶Continental withdraws from eastern marketing picture with sale of properties to Cities Service. . . . ¶Pure Oil Co. holds ceremony commemorating twentieth birthday of Van field, in Texas, first major unitized pool in nation. . . . ¶Humble completing world's second deepest producer, with oil flowing from 14,434-67 ft. . . . ¶Continental to transfer six officers and two department heads to Houston from Ponca City. . . .

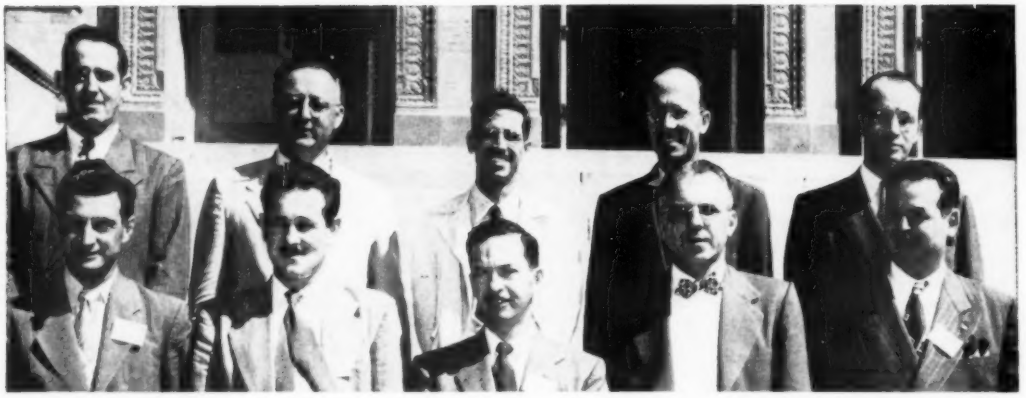
GOVERNMENT—Texas Railroad Commission engineers recommend cut in MER's which would reduce allowables 16 per cent. . . . ¶Congress prepares to end this session with little done on oil legislation. . . . Next session expected to see adoption of national oil policy bill. . . . ¶Full Senate rejects nomination of Leland Olds to third term on FPC. . . .

TRENDS—Crude-oil stocks dropped almost 16,000,000 bbl. in the 13-week period ended October 8 or about 175,000 bbl. daily. . . . Texas crude accounted for 11,500,000 bbl. of the decrease. . . . California crude increased 1,400,000 bbl. in the same period. . . . ¶Crude production in the first half of October has increased about 115,000 bbl. daily over last month. . . . Refinery runs of domestic crude in the first week of the month were about 45,000 bbl. daily less than the September average. . . . If refinery runs continue at this level, crude inventories will be reduced very little in October. . . . ¶Heavy fuel prices gain on Gulf Coast. . . . Eastern distillate markets are "temporarily soft" because of warm weather. . . .

NATURAL GAS—Pacific Gas & Electric Co. discloses it is spending $120,000,000 on big expansion program in various California areas. . . . ¶Hearings will reconvene in Washington October 24 before FPC on consolidated proceedings involving proposals to furnish natural-gas service to markets in Virginia. . . . ¶Oral argument scheduled October 20 before FPC on Colorado Interstate Gas Co.'s proposed natural-gas tariff. . . .

REFINING—Standard Oil Co. (Ohio) dedicates new $11,000,000 fluid catalytic cracking unit at its Lima, Ohio, refinery. . . . Continental Oil Co. announces completion of a new 20,000-bbl. Perco liquid copper treater at its Ponca City, Okla., refinery. . . . ¶Two Texans declare that refiners, sellers of refined products in U. S., suffered a $200,000,000 loss in the past 8 months. . . .

"90 YOOP" means 90 years of oil progress and is one of the slogans used in several communities in celebrating Oil Progress Week. Typical is this scene in Chicago, where the "90 YOOP Girl" watches Mayor Martin H. Kennelly sign the Oil Progress Week proclamation. Watching are: Philip R. Crippen, Jr., chairman of the Oil Industry Information Committee of Metropolitan Chicago; Gerald J. Le Pine, president of Chicago Oil Men's club; Robert H. McElroy, vice president of Pure Oil Co.; A. W. Peake, president of Standard Oil Co. (Ind.); and William J. Gerwe, chairman of the Great Lakes district for the Oil Industry Information Committee



Steering committee for the symposium was composed of, front row, left to right: J. Dvoracek, Climax Engineering Co., Tulsa; E. D. Mattix, Cities Service Refining Corp., Lake Charles; P. G. Murdoch, A. & M. College and committee chairman; R. E. Hansen, Leeds & Northrup Co., Houston; and W. H. Fortney, Humble Oil & Refining Co., Baytown. Back row, left to right: G. L. Farrar of A. & M., committee secretary and director of the symposium; Porter Hart, Dow Chemical Co., Freeport, Tex.; R. E. O'Neill, Industrial Scientific, Inc., Houston; M. K. Andersen, Carbide & Carbon Chemicals Corp., Texas City; and L. W. Parten, Foxboro Co., Houston

Wider Use of Instruments in Process Control Is Predicted

by D. H. Stormont

COLLEGE STATION, Tex. — "The day should not be too far distant when computer control panels are an everyday installation," G. W. McCullough, vice president of Phillips Chemical Co., Bartlesville, declared in an address before the fourth annual instrumentation symposium conducted here October 12-14.

"A plant operator will turn one or two knobs to a final quality desired, and the instruments assembled with the panel will make the adjustments for temperature, pressure, etc." McCullough said.

"The next few years," he added, "should see an increasing number of manual controls delegated to instruments. This will reduce the human element in operations, increase efficiency of the process, and allow the operator more time for other duties."

Conducted by the department of chemical engineering of the A. & M. College of Texas, the short course included 10 papers dealing with various phases of measurement and control in oil refineries and allied manufacturing processes. Registration was slightly in excess of 250.

Costs Going Higher

Speaking on "Economics of Instrumentation," McCullough said that the chemical and petroleum industries have not taken full advantage of recent developments of instruments designed for quality control. "Too much equipment is still operated by hand," he declared.

The high quality required in petroleum products today has led to the development of many types of new instruments capable of achieving the precision control desired, McCullough said. But in achieving the necessary instrumentation, he pointed out, the percentage cost figure in some instances has tripled. For example, in an early-day type natural-gasoline plant the cost of necessary instrumentation amounted to 1.5 per cent of the total plant investment. Instrumentation for a modern natural-gasoline plant, he said, accounted for 3.6 per cent of the total cost.

McCullough then went on to discuss instrumentation costs in refineries, a special-products butadiene plant, and anhydrous ammonia, nitric acid, and other kindred plants. In a refinery costing $2,250,000 the instrumentation would approximate 5.5 per cent of the total cost; in a $38,000,000 butadiene plant it would be 5.8 per cent, his figures showed. Data on nitrogenous-products plants showed instrumentation costs to amount to 2 or 3 per cent of the total investment.

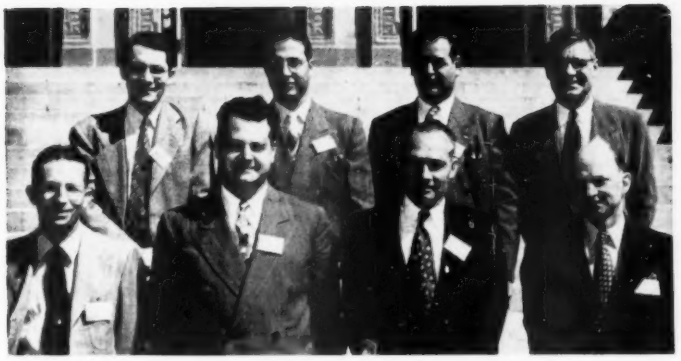
How training and developing of personnel qualified to operate and maintain today's complex instruments is carried out in Humble Oil & Refining Co. plants was discussed by W. H. Fortney of the company's Baytown refinery. Following this address H. K. Eckert of Monsanto Chemical Co., Texas City, presented "What the Production Engineer Needs in Instrumentation."

On the "bread-and-butter" side, and one of the most interesting papers given, was the talk of J. M. Jones, of The Texas Co., Port Arthur, on gadgets and "gadgeteering." Use of simple, shop-made accessories, or standard equipment which has been slightly modified to suit it to the use intended, has a definite place in any wide-awake instrument department, he said. Citing a typical such device, Jones said:

"In the regular instrument parts stock there are a number of parts that can be very easily adapted to service for which they were never intended. One of the most versatile of these parts in the receiver bellows assembly such as used in Taylor or Brown pneumatic receivers. Quite often the instrumentman finds himself in need of a low-pressure switch for some application such as lockout or signaling, and does not have such a pressure-switch on hand. By simply mounting a Taylor or Brown receiving bellows assembly on a home-made base plate, and arranging one or more micro-switches to be triped by the bellows arm, he will have a very dependable pressure switch which can be set to very narrow limits."

Other Papers Presented

"Control of Product Quality Type Infrared Analyzers," by G. A. Martin of Standard Oil Development Co., Elizabeth, N. J., dealt with the physical principles on which these new type analyzers work and described their possibilities and limitations. "The Effect of Control Point Location Upon Column Control," by K. D Uitti of Universal Oil Products Co., Chicago, dealt with deck temperature



Authors of papers at the A. & M. symposium were, front row, left to right: J. M. Jones, The Texas Co., Port Arthur; G. M. McCullough, vice president and general manager, Phillips Chemical Co., Bartlesville; A. I. Dahl, National Bureau of Standards, Washington; G. A. Martin, Standard Oil Development Co., Elizabeth, N. J. Back row, left to right: D. H. Fuller, Foxboro Co., Foxboro, Mass.; F. J. Spuhler, Humble Oil & Refining Co., Baytown; W. H. Fortney, Humble, Baytown; and H. K. Eckert, Monsanto Chemical Co., Texas City. Authors not present in the picture were K. D. Uitti, Universal Oil Products Co., Chicago; and H. D. Noll, Houdry Process Corp., Marcus Hook, Pa.

curves, effect of holding constant temperatures on intermediate decks, and limits of product purity.

Two papers dealing with temperature control were "Measurement and Control of Temperature," by D. H. Fuller of Foxboro Co., and "Measurement of High Temperatures in Gas Streams," by A. I. Dahl of the National Bureau of Standards, Washington.

Dahl's address dealt chiefly with a new instrument devised to serve as a laboratory standard for the measurement of gas temperatures up to about 1,600° F. It consists essentially of a chromel - alumel junction surrounded by an inner tubular shield of silver and outer electrically heated shield of steel. The latter is provided with a heating element of nichrome ribbon, insulated from the tube with mica. The individual effects of thermal radiation, convection, and conduction on the indications of various types of temperature probes also were covered.

Measurement and instrumentation problems connected with two refining processes were covered in two other papers. H. D. Doll of Houdry Process Corp., Marcus Hook, Pa., discussed "Measurement Problems in Typical Fixed Bed Catalytic Processes;" and F. J. Spuhler of Humble Oil & Refining Co., Baytown, described "Instrumentation Problems in Extraction Processes."

Eastern Marketing Properties of Continental Sold to Cities Service

NEW YORK.—Continental Oil Co. is withdrawing from direct marketing operations in the East and has sold its properties in that section principally to Cities Service Co.

The transaction was disclosed in a joint announcement of the two companies October 14. W. Alton Jones, Cities Service president, listed the properties acquired by his company as 51 service stations, 23 bulk plants, ocean terminals at Baltimore, Norfolk, Va., and Wilmington, N. C., and barge terminals at Richmond and Warsaw, Va.

In addition, Continental sold 14 service stations in Baltimore, Washington, and Norfolk to Shell Oil Co. The former Continental outlets served the East Coast area from New York to Florida.

Price involved in the sale was not disclosed. However, it was reported that the Continental properties had been valued at approximately $7,500,000.

L. F. McCollum, Continental president, said the move implements the company's policy of concentrating its marketing capital to the best possible advantage. "Discontinuance of Conoco branded marketing on the Eastern Seaboard is a final step by Continental to shift its marketing investment to the Middle West, the Southwest, and the Rocky Mountain states," he said. "In those western areas Continental is a large producer of crude oil and maintains eight refineries strategically located to serve those markets."

The Continental president said the company has crystallized a program of intensifying its merchandising efforts in the solid block of states in the center of the United States from the Canadian Border to Mexico and the Gulf. "Within this area," he said, "we can transport our products to market with the greatest economic and competitive advantage. Additional marketing investments which are now planned will be concentrated in this integrated area, but our premium oil will, of course, be sold in a much wider market."

Continental will continue to sell in world markets products from the Lake Charles refinery not required for interior distribution. These will be cargo-lot transactions. The joint announcement said that it is anticipated that Cities Service will succeed Continental as the supplier of Conoco's branded jobber distributors in the East.

Cities Service and Continental are joint owners of a new lubricating-oil plant at Lake Charles, La. Cities Service holds 65 per cent interest, and Continental the remainder. This $35,000,000 plant, operated by the Cit-Con Oil Corp., last week sent out its first carload of lubricating oil to a Cities Service terminal near Philadelphia.

Program Launched to Increase L.P.G. Sales

A nation-wide promotion program to boost the sales of liquefied petroleum gas will be launched immediately by the Liquefied Petroleum Gas Association, the Natural Gasoline Association of America, and the Gas Appliance Manufacturers Association.

The program calls for spending $500,000 the first year and $1,000,000 per year thereafter on advertising, publicity, training salesmen, and special public-relations problems. Funds will be raised by voluntary contributions to be sought from all producers and distributors of L.P.G. and manufacturers of appliances, and will be expended under the direction of a joint committee of the three associations.

The principal objectives of the promotion campaign are to maintain the gains made by the L.P.G. industry in recent years, to combat the competition of the electric industry in expanding the use of electricity for cooking and water heating in rural and suburban areas, and to expand all markets for L.P.G. and appliances.

The chief target is farm and home use of L.P.G., but expanded markets will also be sought in industrial applications and among restaurants, tourist courts, and other commercial operations. The greater portion of the fund will be used in advertising, but substantial sums will be spent on market research and in general publicity designed to promote cooking and heating with bottled gas.

WASHINGTON WATCHING

BY BERTRAM F. LINZ

Easily Explained

WASHINGTON.—According to Sen. James E. Murray of Montana, there is nothing complicated in proposals to extend Federal Power Commission control to the production of natural gas.

"Gas is not produced; it is just taken out of the ground," Murray explained to the Senate last week in urging confirmation of Leland Olds as a member of the FPC.

But, of course, the senator emphasized, coal, copper, and other minerals—some of which happen to be produced in Montana—are in a different category. They are sold to industry, whereas "there is only one place where gas can be sold, and that is to private consumers, people in small homes."

Reminded that only 16 per cent of the gas produced is so sold, Murray hastened to explain "that may be true at the present time, but we are thinking about the future."

Continuing his lesson in economics, Murray informed the Senate that copper, lead, etc., are under "competitive control" that insures the public gets them at a fair price, but gas is different and while, if it is to be regulated it should be done by act of Congress, the basis for regulation "is there by the natural fact that it is gas and is going into the service of the people on that basis; and therefore it should be controlled."

Murray conceded that the producers of coal, oil, and mineral can sell their product for whatever they can get, but insisted those commodities are sold "to a free market and not sold to the public."

It is perfectly all right for an owner "to hold his gas in the ground at the well," Murray said, "but if he is going to sell gas to the American people and make millions of dollars out of it, he should come under government control."

Thus, in simple terms did the senator from Montana give a simple explanation of a problem which has long worried the oil and gas industries.

Too Much Relief?

THE percentage depletion allowance to which oil producers are entitled under the current tax law is slated for a thorough going over next year. Congress is to make a full investigation of the whole subject of depletion.

The Treasury Department has been attempting to eliminate the oil-depletion allowance for a number of years, but its efforts in the past were always rebuffed by Congress.

During the past few years, however, depletion allowances have been extended to a number of minerals and an agreement has been reached that it is time the whole question was reviewed.

A full study and hearings have been scheduled by the House ways and means committee for next year, when the Treasury will be asked to submit a formula for the application of depletion allowances.

In view of the fact that a number of minerals and clays are now beneficiaries of the depletion allowance as well as petroleum, it is not expected that any effort will be made to wipe the deduction out entirely, but the Treasury is expected to ask Congress to place limits upon the period for which it can be taken.

Every time the question of tax revision comes up, Treasury recommendations calling for action on the oil-depletion allowance are submitted by Treasury officials who contend the producers are receiving entirely too much "relief," and contend that limitations should be imposed.

More Cars to Fuel (?)

THE Federal Reserve Board has been surveying the financial position of American consumers and has come up with some findings that may be of interest to the oil industry.

Despite the readjustment in business activity during the first half of 1949, approximately 74 per cent of persons interviewed estimated their 1949 income would be as large as last year or better, 56 per cent expecting to have more than they did in 1948.

Translated into the purchase of automobiles which the oil industry will be called upon to fuel, it was found that as large a percentage still intended to buy new cars as had indicated that intention early in the year before the effects of industry readjustment became evident. Eleven per cent of those interviewed were definite, 4 per cent said they "probably" would buy, and 5 per cent were undecided as to what they would do in the next 12 months.

When asked whether they would be buying in 1949 or in the first half of 1950, however, roughly 3 out of 4 said it would be in the later period, whereas there was no similar postponement indicated for carrying out intentions to buy other durable goods.

The board expressed inability to determine the basis for this difference, which it pointed out could mean that purchasing intentions were not too firm, could be a reflection of seasonal influences, a desire to wait for new models or anticipation of possible price declines.

There were indications that price prospects might play a part in decisions to defer buying cars, since 48 per cent of those interviewed expected prices to go down and 34 per cent expected no change, while only 7 per cent foresaw an increase.

Still Talking

THE British-American oil talks have now been running a month, but so far nothing has been accomplished toward defining the questions to be resolved at higher-level conferences for which their meetings are preparing.

The British delegates have not yet made clear just what they want, other than to stress their dollar starvation and the need for increased oil markets, and the talks appear more or less to be marking time until England settles its oil-price problem.

The present situation appears to parallel one that occurred during the war, but with the positions of the two countries reversed.

During the war, British oil companies were unable to deliver oil to the Latin American markets, and international allocation committees were set up. Under the decisions of those committees, the percentage of the requirements of each country that could be met was established and arrangements made to retain the pre-war status of all interests.

Under this arrangement, an American company which had, for example, been providing 25 per cent of the imports of a particular Latin American company was held to that percentage of the wartime supply, and the British share of the market was protected by oil shipped from Aruba or other points in the name of the British supplier. No American company was permitted to increase its percentage of the business at the expense of anyone else.

Currently, the situation is in a way reversed and the objective of the U. S. Government is to protect the interests of our companies in foreign markets which the British would like to take over.

The final outcome of the talks may well be an arrangement somewhat along the line of that entered into during the war.

Some of the men behind the scenes of the Biloxi meeting, one of the biggest regional meetings ever held jointly by the A.A.P.G. and the S.E.G. Front row, left to right, are W. B. Neill, Stanolind Oil & Gas Co., Lake Charles, La., president of the South Louisiana Geological Society; Dee E. Newland, consultant, Lake Charles, chairman of the field-trips committee; Thomas H. Philpott, Carter Oil Co., Shreveport, general chairman of the meeting; Lawrence J. Finfrock, Carter Oil Co., Jackson, Miss., assistant chairman of the publications committee; and James L. Martin, Jr., Sinclair Oil & Gas Co., Jackson, general committee. Back row: Charles A. Hickox, Centenary College, Shreveport, chairman, finance committee; Fred M. Schall, Jr., Big Chief Drilling Co., Shreveport, general committee; Grover E. Murray, Louisiana State University, Baton Rouge, chairman of the technical-equipment committee; Charles DeBlieux, consulting geologist, New Orleans, treasurer, New Orleans Geological Society; Leslie Bowling, consulting geologist, New Orleans, president of the New Orleans Geological Society; Hastings Moore, Danciger Oil & Refining Co., Henderson, Tex., chairman of the publicity committee; and George E. Wagoner, Carter Oil Co., Shreveport, national vice president of S.E.G.

Revolutionary Electric-Logging Development Revealed at Biloxi

by Charles J. Deegan

BILOXI.—Schlumberger Well Surveying Corp. chose the joint regional meeting here of the American Association of Petroleum Geologists and the Society of Exploration Geophysicists to make a formal announcement of new developments in electric logging that promise to be revolutionary.

The announcement came in the form of a paper by the man who developed the new methods, A. P. Claudet of Schlumberger's New Orleans office. The title of the paper was "A New Method of Local and Regional Correlation, Using the Resistivity Value From Electric Logs."

A. P. CLAUDET

The abstract indicated that a method had been found which would differentiate and identify marker beds in shale formations. This would have been important enough, particularly in Tertiary territory with its characteristic thick shale and sand sections. But it developed that Claudet had even greater things to promise for the new method.

He divided the potentialities into three groups, as follows. First, identification by precise resistivity measurements of the shale beds and the resistivity sequence of all the shale beds for a specific field or general area. From this the result is immediate and early correlation on exact values. Second, location of faults, pinchouts, facies changes, or other geological anomalies. Third, identification of the sedimentary cycle into (a) deep water assemblage, or (b) brackish water assemblage.

Through precise resistivity measurements, it is claimed the new method develops characteristic electrical properties of various beds that are in effect as definite as finger prints for identification. While primarily developed for use in Miocene Tertiary sections, Claudet feels it will work equally well in other parts of the geologic column; that, in fact, the Miocene is probably the most difficult case.

1,000 in Attendance

The Schlumberger announcement was merely the highlight of the program. The attendance of about 1,000 geologists and geophysicists certainly indicated that the oil companies still have plenty of faith in the ultimate producing possibilities of the southeastern states, despite a recent lull in good finds. The high percentage of younger men at the meeting pleased national officers of the two associations because, they said, the program of regional meetings was designed to reach the younger men who do not get a chance to attend the national conventions.

The geological program in general divided into two types of papers. These were either broad general discussions of regional geology, or discussions of general types of structures on the one hand, and papers on specific oil fields on the other.

The specific fields discussed were: Merigale-Paul, in Wood County, Texas; Blackfoot, in Anderson County, Texas; Cairo, in Union County, Arkansas; Brookhaven, in Lincoln County, Mississippi; and LaGrange, in Adams County, Mississippi.

On the other hand, there were the following broad-type papers: "Geosynclinal Sedimentation in Central Gulf Region of United States," by Grover E. Murray, Louisiana State University, Baton Rouge, La.; "Control of Petroleum Accumulation by Sedimentary Facies in South Louisiana," by Max Bornhauser, Continental Oil Co., Houston; "Structure of South Louisiana Deep Seated Domes," by W. E. Wallace, Sohio Petroleum Co., Lafayette, La.; "Interior Salt Domes of East Texas," by G. C. Clark, Stanolind Oil & Gas Co., Tyler, Tex.; "Petroleum Exploration in Eastern Arkansas," by C. A. Renfroe, Arkansas Resources and Development Commission, Division of Geology, Little

Rock, Ark.; "Surface and Subsurface Correlation of the Wilcox Formation in West Central Louisiana," by D. A. Robertson, C. M. Schwartz, and A. H. Trowbridge, representing work done as students at Centenary College, Shreveport, La.; "Facies Changes in Gulf Cretaceous Beds in Mississippi," by Tom McGlothlin, consultant of Laurel, Miss.; "Drilling Difficulties in the North Florida-South Georgia Area," by Donald J. Munroe, Sun Oil Co., Tallahassee, Fla.; "Stratigraphic, Structural, and Correlation Studies of Florida Tertiary," by Robert O. Vernon, Florida Geological Survey, Tallahassee, Fla.; "Preliminary Report on Buried pre-Mesozoic Rocks in Florida and Adjacent States," by Paul L. Applin, U. S. Geological Survey, Tallahassee, Fla.; and one paleontological paper, "Occurrence of the Genus Choffatella in Wells in South Florida and at Other Localities," by Louise Jordan, Sun Oil Co., and Esther R. Applin, U. S. Geological Survey, both from Tallahassee, Fla.

The section of the program devoted strictly to geophysics was marked by a number of unusual and novel developments. The first paper represented something new in geophysical literature. The title tells the story "Geophysical 'Case History' of the Mississippi Salt Dome Basin," by L. L. Nettleton, Gravity Meter Exploration Co., Houston. Dr. Nettleton discussed the results of the first 2 years of gravity exploration work in a whole region, where sufficient development has since taken place to evaluate the original work. This was followed by a paper on the ever-present surveying problem, "Applied Radar in the Gulf of Mexico," by Orville E. Haley, McCollum Exploration Co., Houston

This was followed by two papers on subjects that are so new they are still relatively unknown to most geophysicists and geologists. "The Oceanographic and Meterological Aspects of Geophysical Pro pecting," was presented by Alfred H. Glenn and Charles C. Bates, who are respectively with Alfred H. Glenn & Associates, New Orleans, and the U. S. Navy Hydrographic Office, Washington. The other paper consisted of two parts, first a reading of a paper, and second a demonstration on the beach in front of convention headquarters. "The Part Helicopters are Playing in Geophysical Exploration" was discussed by E. E. Gustafson, Bell Aircraft Supply Corp., Lafayette, La. Then one of the company's helicopters landed on the beach, where a seismograph shot hole drilling rig had been set up. The rig was torn down, packaged into units, picked up by the helicopter and, in five trips, moved to a new location.

Birthday of Van Field Is Celebrated

THE first major unitized oil pool in the United States, the Van field, in Van Zandt County, Texas, observed its twentieth anniversary October 14, and city, county, and state officials helped make the celebration one to be remembered.

L. S. Wescoat, Chicago, president of Pure Oil Co., the firm which discovered the field, addressed a group of more than 2,500 employes and others on the occasion and said that "measured by any standard, the Van oil field is one of the outstanding oil fields in the United States.

"Only so many wells have been drilled as were necessary to bring the oil to the surface in accordance with the best engineering principles looking toward the conservation of the field and the maximum ultimate recovery from the underground pool," he said.

Wescoat reported the highlights of the field's operations, and pointed out that under the unit plan at Van the minimum amount of major equipment is required; that jointly owned facilities are used to operate the properties without regard to lease lines; that well-servicing crews work over the entire acreage; and that only one warehouse is operated, one fleet of trucks is in service over the miles of unit-maintained roads with minimum shutdown time.

The field has produced more than 200,000,000 bbl. of oil in its 20-year history, and has today a greater vitality and longer life expectancy than many recently discovered major oil fields, Wescoat said. *(A detailed engineering article on the operation of the Van field appears on page 89 of this issue).*

Highlighting ceremonies October 14 in observation of the twentieth anniversary of the Van oil field in Van Zandt County, Texas, was a huge cake, complete with 20 candles, and topped by a replica of Pure Oil Co.'s I Jarman, discovery well of the field

16 Per Cent MER Cut Recommended in Texas

AUSTIN. — Recommendations made by Railroad Commission engineers for 1949 MER's (maximum efficient rate of production) for Texas fields would reduce the daily crude allowable of the state by 344,521 bbl., or 16 per cent of current allowables.

The recommendations, which covered all fields except East Texas, were made in a memorandum to the commission dated August 16, but details were made public only last week. James A. Hall, senior engineer, and Clyde Keithly, petroleum engineer, prepared the memo.

The recommendations of the two engineers are not in accordance with the recommendations made by the operators of the state in the MER hearing held several months ago. Hence, Commissioner Ernest O. Thompson has announced that the operators will be permitted "show cause" hearings to present reasons that MER's should not be reduced. A number of these hearings have already been scheduled. Among these are Van, Yates, McElroy, Foster, Stowell, Thompson, and Sherman fields.

The recommendations for lower field MER's will result in a reduction of the daily allowables in the various districts as follows:

District—	Barrels	Per cent
1 (Southwest)	2,753	7.8
2 (Southwest)	21,022	10.5
3 (Gulf Coast)	94,364	17.1
4 (Southwest)	26,872	9.4
5 (Eastern)	5,294	9.3
6 (Eastern)	7,050	5.3
7-B (West Central)	14,306	16.4
7-C (West)	15,302	21.7
8 (West)	106,437	12.0
9 (N. Central)	33,103	16.2
10 (Panhandle)	18,018	16.4

In determining the new MER's, Hall and Keithly used a system outlined by Hall in a commission memo of July 18. This document classified the state's fields and/or reservoirs in three categories: (1) Reservoirs having sufficient reservoir performance data for the determination of an MER. (2) Reservoirs having insufficient information for the determination of an MER. (3) Reservoirs on a decline basis due to water production or limited capacity.

Hall recommended a table of allowables to provide for each of the three MER categories for fields over 2 years old. For fields in the first category and under 2 years old, the engineers set forth a detailed guide for determining the MER. Hall's memo was used for all calculations, except in a few cases of water-drive fields having very low bubble points.

Congress, With Little to Show Regarding Oil, Prepares to Quit

by Bertram F. Linz

WASHINGTON. — Congress moved toward adjournment this week, some 2½ months after the statutory deadline of July 31 it had set for itself and with practically nothing in the way of oil legislation to show for the more than 10½ months it spent in Washington.

In its failure to deal with oil problems there was both good and bad, from the viewpoint of the industry.

Oil men would have liked, for instance, to have had Congress enact the legislation revamping the Natural Gas Act to exempt producers and gatherers from Federal Power Commission control, dispose of the vexing tidelands issue, and solve the imports problem.

On the other hand, they were pleased that nothing was done on proposals for divorcement of the several branches of the industry and that investigation of gasoline prices did not result in a drive for "control" legislation.

The most important oil measure which did get through Congress and was approved by the President called for elimination of the premiums which independent refiners were paying for Government royalty oil under the O'Mahoney Act which gave them a preference.

Other Bills Approved

Of less widespread interest were bills, also approved by the President, extending the period for which mineral leases may be made on lands in Idaho and Wyoming.

Congress also disposed of the overtime-on-overtime problem raised by a Supreme Court decision, made provision in the appropriation bill for the Interstate Commerce Commission for completion of the pipe line valuation, and in the last days of the session succeeded in loosening the bill to permit sellers to quote delivered prices and absorb freight, necessitated by the Supreme Court decision in the Cement Institute case, which had been tied up in conference for many weeks.

So far as President Truman's own program was concerned, the first session of the Eighty-first Congress gave him only a part—but an important part—of what he asked, the major measure from the standpoint of the industry being the extension of the Trade Agreements Act with no fetters upon his authority to reduce import duties to as low as 50 per cent of the rates in effect at the close of 1945 in negotiating new reciprocal trade agreements.

The record on the few purely oil matters which did receive attention is brief: The House passed the bill to exempt independent producers and gatherers of natural gas from FPC regulation but it did not come up on the Senate floor; committees of both chambers held hearings on tidelands, but got no further; an effort to secure a quota on oil imports failed when the Senate refused to put the provision in the Trade Agreements Act, and several bills to limit imports have been filed, to be pressed next year; a House committee held hearings on proposals, approved by the Interior and Agriculture Departments, to make subject to competitive bidding all leases for oil and gas development on the acquired lands in which a competitive interest is evidenced, but tabled the measure; and a bill providing for creation of a national oil council was introduced in the House.

No action was taken on legislation to get development of the synthetic liquid fuels industry under way, dealing with pollution of streams, or eliminating the tax advantages of cooperative associations.

In the more general field of legislation which would affect the oil industry as well as others, the Senate passed a bill repealing the Taft-Hartley Labor Management Relations Act but after a fight on the House floor the subject was returned to committee; the House passed legislation expanding the Social Security Act, and committees of both houses approved measures dealing with the President's "Point 4" program, under which the Export-Import Bank would guarantee that Americans making investments abroad could convert their foreign earnings into dollars and that they would receive compensation in dollars for properties expropriated, confiscated or seized by foreign governments.

It must be borne in mind that none of the measures which failed of enactment this year are actually dead. The Eighty-first Congress still has another session, and will pick up next January where it left off this month, and the score for the Congress cannot be totaled until final adjournment next summer.

Sohio Dedicates $11,000,000 Cracker

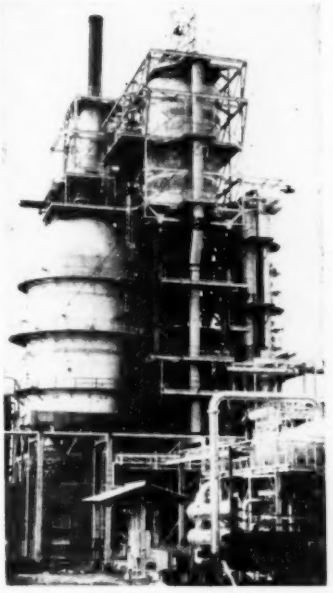
A NEW $11,000,000 catalytic cracking plant, first unit to be completed in the $30,000,000 expansion and modernization program at the Lima refinery of Standard Oil Co. (Ohio), was formally dedicated on October 19.

W. T. Holliday, chairman of the board, and Clyde T. Foster, Sohio president, took part in the dedication ceremonies, and city and county officials were on hand for the occasion.

The catalytic cracking unit was completed within 15 months from the day ground was broken by E. B. McConnell, Sohio's vice president in charge of manufacturing, and the company announced that public ceremonies will be held next summer to mark completion of the entire expansion and modernization program.

The $30,000,000 expansion program will turn the company's Lima plant into an up-to-date refining center, and will double its present capacity. The new cracking unit is expected to run 16,000 bbl. of crude per day.

In addition, Sohio is constructing a continuous crude and coking unit, which will cost $5,500,000, and a new solvent refining plant, which will cost approximately $13,628,000. Also included in the expansion is new tankage totaling 200,000 bbl., a new liquefied-gas plant, and a new office building and laboratory.



Standard Oil Co. (Ohio's) new $11,000,000 fluid catalytic cracking unit at the Lima refinery, which was formally dedicated October 19

Texas Orders Third Successive Allowable Boost for November

by Leigh S. McCaslin, Jr.

HOUSTON.—Texas will be able to provide a large part of the anticipated nation-wide increased demand for crude oil in the fourth quarter by virtue of last week's 137,606-bbl. increase in November daily allowables.

After hearing several purchasers testify that they would import foreign crude if domestic crude was not made available, the Railroad Commission ordered one additional producing day for all fields. Thus, East Texas field will flow for 18 days in November and the rest of the state's fields 20 days. Total calendar-day allowable for the month will be 2,286,175 bbl.

Last week's action marked the third consecutive increase in allowables after a series of eight reductions. The new figure is still 388,364 bbl. below the peak of 2,674,539 bbl. reached last December.

Sour-Crude Cut Asked

In the most spirited hearing for several months, the commission heard much on sweet crude vs. sour crude. A number of purchasers indicated that they would like to see more producing days for sweet-crude fields and no change for sour-crude fields. However, the commission decided to stick by its announced policy of "across the board" cuts. Commissioner Ernest O. Thompson commented that the commission "has been trying to get away from selective buying because a refiner naturally wants the sweetest crude possible, the crude closest to his refinery, and crude from his own fields where possible." This, he continued, would result in some fields having no market at all.

Actual production in Texas for November is estimated by the commission at 2,171,867 bbl. daily. This is based on an underproduction of 5 per cent caused by wells unable to make their allowable. By the end of the month, however, the board believes this figure will be increased an average of 17,000 bbl. daily by discoveries and allowable adjustments. This gives a net figure of 2,188,867 bbl., which is 41,133 below the Bureau of Mines' forecast of 2,230,000. This forecast, incidentally, is up 100,000 from September. Crude purchasers had made nominations for 2,494,562 bbl. before the meeting, an increase of 75,046 over the previous month.

The November allowable, by districts, compares with the net allowable on October 8 as follows:

ALLOWABLE, BY DISTRICTS

District—	November allowable (bbl.)	Increase over Oct. 8 (bbl.)
1—Southwest	30,349	842
2—Southwest	134,815	10,213
3—Gulf Coast	424,247	24,493
4—Southwest	214,718	12,896
5—East Central	39,838	3,138
6—Eastern Texas	96,279	8,407
7—E. Texas field	273,848	22,434
7-B—W. Central	73,144	2,298
7-C—W. Central	57,284	2,812
8—West Texas	644,548	14,941
9—North Texas	183,758	5,118
10—Panhandle	113,347	14
Total	2,286,173	137,606

The next statewide proration hearing will be held in Austin on November 15.

First witness to answer the commission's roll call for last week's hearing was V. E. Smith, vice president, Petrol Refining, Inc., Texas City. Smith asked for a 25 per cent increase in allowables after saying that his company had been trying since September of 1947 to get 30,000 bbl. per day of domestic crude. He said Petrol was being offered foreign crude at "attractive prices" and intends to continue importing, if necessary. Smith added, though, that they would prefer to buy domestic crude if it is made available.

E. R. Turner, president of Pan-American Production Co., seconded Smith by saying that his company needed two additional producing days in November in the 41 fields where it produces. He added that even with this large increase the Pan-American Refining Corp. plant at Texas City would still be far short of the desired working level of crude stocks. In response to questions by the commission, Turner said that the Texas City plant was now refining West Texas sour crude, although it is not suited for this processing. Plans are under way to provide facilities to handle sour crude, he continued, but such a conversion will take 1½ years to complete.

John Caffery, representing Sun Oil Co., stated that Sun's crude stocks had fallen from 8,879,000 to 8,309,000 bbl. in the 3-month period of June to August. During that time, imports by his company totalled 416,000 bbl. Imports during September and October will total 360,000 bbl. at the present rate, he added.

Sun would not have imported if domestic crude had been available, Caffery continued. He requested at least two additional producing days in the districts where Sun buys, which he named as Districts 3, 4, 6, and 7-C. In response to questions, he said that his company cannot use West Texas sour crude and that its foreign imports are coming from Venezuela. The particular crude purchased in Venezuela by his concern has less sulfur content, he added, than the sweet crude of East Texas field.

Herman Pressler of Humble Oil & Refining Co. announced his company's nominations for November as 487,905 bbl. This figure was based on one additional producing day for all districts except 7-C and 8 (West Texas). For West Texas, Humble asked that the allowables stay the same as for October.

Raymond R. Meyers of Magnolia Petroleum Co. changed the tenor of the previous testimony by stating that Magnolia's nominations were approximately the same as for October. He said that their pipe lines from West Texas are full, and that any increased production would have to go to storage.

A telegram from Hiram G. Brown of Talco Pipeline Co. petitioned the commission for 20 days in the asphaltic-crude fields of East Central Texas. H. P. Nicholes, executive vice president of the East Texas Oil Association, asked for two more producing days in the East Texas field, in spite of the fact that the weighted-average bottom-hole pressure for the field declined 5.53 psi. during September.

Stocks Worked Down

Commissioner Thompson interrupted at this point to say that the state has "largely worked off excessive stocks." He told the 150 oil men present that storage reached an all-time high in Texas of 130,137,000 bbl. last April 16. This has been reduced to 118,558,000, or a 11,579,000-bbl. cut, by October 1, he continued. He cited further figures to show that West Texas reductions accounted for 7,003,000 bbl. of this cut. Thus, Thompson said, the industry "did find it possible to use West Texas crudes."

The next witness, Paul McDermott of Sinclair Oil & Gas Co., told the group that his company would like to have East Texas field put on the same producing schedule as the remainder of the state. Ralph O. Dietler, Stanolind Oil Purchasing Co., Tulsa, recommended that if sweet crude fields are allowed additional production, sour crude fields remain at present levels. Ira Butler, representing York & Harper, Inc., Midland, interjected a comment that Commissioner Thompson's storage figures showed a need for West Texas crude.

The hour-long hearing was concluded by a plea for an equitable share of the state production for West Texas. This plea was made by W. P. Z. German, Jr., Midland, representing Fred Turner, Jr., and 23 other West Texas independents.

International

WORLD-WIDE OIL DEVELOPMENTS

Davies Announces Spudding of First Well Under Mexican Deal

MEXICAN AMERICAN INDEPENDENT CO. last week spudded in its first well to be drilled under the percentage contract the company negotiated in March with Petroleos Mexicanos.

The well, 1 Tortuguere, is located just west of Coatzacoalcos in Vera Cruz. It will be drilled from the beach into an untested structure a short distance offshore in the Gulf of Mexico.

The company also is reported planning to operate another rig to drill its second test at Xicalango near Ciudad de Carmen in the state of Campeche. This is also a wildcat operation.

In an announcement in Mexico City, Ralph K. Davies, president of American Independent Oil Co. de Mexico, S.A., principal interest holder in Mexican American Independent, the operating company, declared that the Tortuguere well is a "significant and historic step forward in the economic relations between Mexico and the United States."

To Go to 6,000 Ft.

"The fact that we have been able in such a comparatively short time to complete investigation and to have a rig on location and drilling is proof of what can be accomplished with cooperation between Mexican and North American technicians and oil men working together under a system of free enterprise," Davies said.

Barring unforeseen delays, the well is expected to reach a depth sufficient to test indicated producing horizons in 6 to 8 weeks. This is expected to be about 6,000 ft. Drilling contractor for the operation is Kerr-McGee Oil Industries, Inc., Oklahoma City.

The contract signed last March provides that Mexican American Independent (C.I.M.A.) will be reimbursed for advances and expenses, including dry-hole costs, out of 50 per cent of production obtained. In addition, it will receive from 15 to 18¼ per cent as compensation. On completion, Pemex will conduct all producing operations.

First company of size to reenter Mexico following the 1938 expropriation was Cities Service Oil Co. which about a year and a half ago signed an agreement with Pemex to provide capital for exploration of more than 1,000,000 acres in northeastern Mexico formerly controlled by Cities Service. An oil payment is provided. Thus far three wells have been drilled under the land. Two more are planned this year. None of the wells was a producer, though encouraging shows were reported.

Gus and Fred Wiegand, drilling contractors of San Antonio, have been drilling in Mexico for the last 6 months under a percentage arrangement with Pemex.

Davies recently revealed that the combined total investment thus far made in its operations in Mexico and the Neutral Zone of the Middle East approximates $20,000,000. American Independent Oil Co. holds an undivided half interest in the Neutral Zone and late in September dispatched a converted LST from Orange, Tex., to commence operations there.

In the Mexican venture, originally American Independent, Fred W. Pauley, and Signal Oil & Gas Co. held equal third interest. Subsequently, American Independent increased its holding to 53⅓ per cent by purchasing part of Pauley's share, and Pauley has disclosed he is planing to enter into similar arrangements with Pemex for other drilling.

Exploration Company Is Formed in Africa

A new company to carry out oil exploration in French Equatorial Africa has been organized in Port Gentil, according to Paris reports.

The Equatorial Africa government and the French Treasury are interested in the new enterprise which will have a capital of 775,000,000 African francs. The pattern of a joint colonial-French government company for oil exploration is the same as that followed by France in some of its North African territories.

Japan Asks for Bids On Crude-Oil Supply

THE Japanese Ministry of International Trade and Industry last week called for bids for the first crude oil to be imported since the war with specifications calling for payment in sterling and thus virtually excluding American suppliers.

The invitation to supply 4,005,000 bbl. of crude was issued by the SCAP Foreign-Trade Office in New York October 10.

For American companies the obstacle in the invitation is the pound-sterling payment provision. The purchase announcement said provisions for payment of any offer made pursuant to the invitation must comply with the requirements of the appropriate sterling-exchange control.

Under existing British regulations, American companies producing dollar crude are not able to trade in sterling. This fact has been one of the principal complaints of the American producers against the British, who have been expanding their world markets at the expense of dollar oil.

As a result of this provision, the British companies—Anglo-Iranian Oil Co., or Shell—are expected to take the Japanese contract. In fact, an announcement in Tokyo last week said Anglo-Iranian already had arranged to supply 635,000 tons of crude (about 4,800,000 bbl.). Japan has sterling credits which accrued under its recent trade agreement with Britain.

The delivery schedule set up for the crude in the invitation to supply provides for 480,000 bbl. to be landed in Japan before December 15; 480,000 bbl. before January 15; and 3,045,000 bbl. before July 1.

The crude oil will be used in the reopening of Japan's so-called Pacific Coast refineries. These plants operated before the war on imported oil but were closed down in 1946 by occupation authorities.

The Tripoli refinery of Iraq Petroleum Co., Ltd., which charges 5,000 bbl. of Iraq crude oil daily. Construction work now under way will double the capacity of the refinery. In the background may be seen a portion of the refinery's tank farm, which includes 36 storage tanks, each with a capacity of 93,000 bbl. At the Tripoli terminal the company now is installing a fourth 12-in. sea line to increase tanker loading capacity of the terminal

Kirkuk-Mediterranean System To Reach Half Capacity in 1950

International

IRAQ PETROLEUM CO. expects to move more than 130,000 bbl. of crude oil daily in 1950 through its Kirkuk-Mediterranean pipe-line system.

This is in spite of Iraq's refusal to permit the movement of oil through the existing 12-in. line to Haifa and the fact that the company can not now complete its 16-in. loop to Haifa.

Crude oil now is flowing from the company's Iraq oil fields through a 12-in. line to Tripoli completed in 1934 and a new 16-in. line paralleling this route. The 16-in. loop was placed in operation in July of this year and is expected to be operating at full capacity next year.

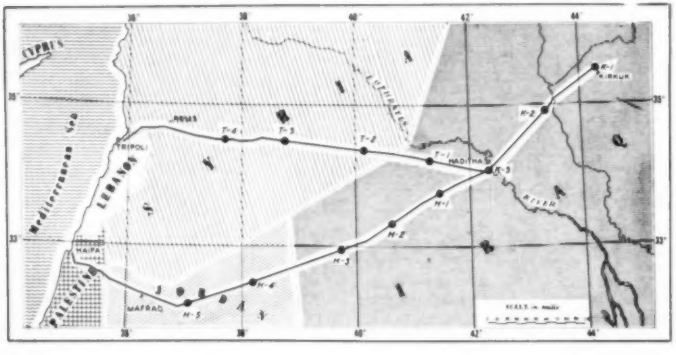
Total capacity of I.P.C.'s Kirkuk-Mediterranean system is to be 270,000 bbl. daily, when in full operation. This goal cannot be achieved until the company is permitted to place in operation its 12-in. line to Haifa and to lay the last 40 miles of pipe on the 16-in. line to Haifa. The completed system linking Iraq oil fields with the Mediterranean will be the two 12-in. lines, one to Haifa and one to Tripoli, and the two 16-in. lines along the same routes.

Oil first was found near Kirkuk in 1927. By 1931 adequate reserves had been proven to justify construction of a pipe-line system to the Mediterranean, and necessary transit arrangements were made by the company with Palestine, Transjordan Syria, and Lebanon.

The company began actual construction on the system in 1932, laying two 12-in. lines from Kirkuk to the Euphrates River. Here the lines divided, one traversing Transjordan and Palestine to the Bay of Acre north of Haifa, the other going across Syria and Lebanon to Tripoli.

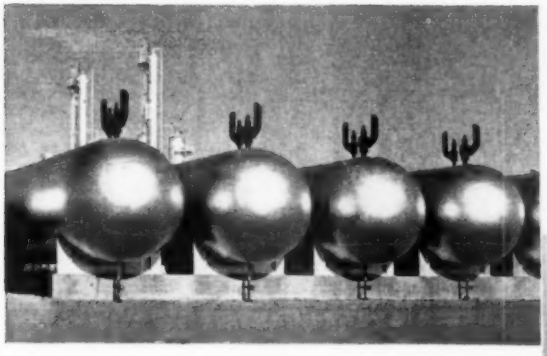
The northern line, 532 miles long, was completed in July 1934. The southern line, 620 miles in length, was finished in October. Together they were the first all-welded pipe lines to be built outside the United States. Each has a capacity of 42,000 bbl. daily.

As production in Iraq increased the company began laying plans for increasing the capacity of the pipe-line system accordingly. The war delayed these plans and it was not

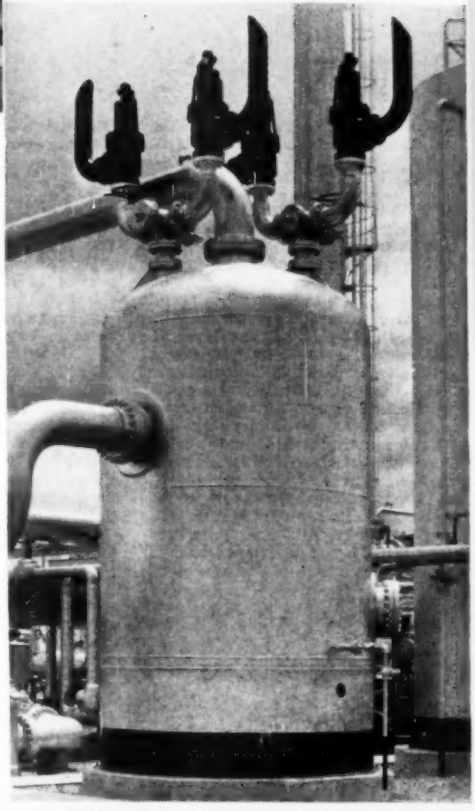


Map of the Kirkuk-Mediterranean pipe-line system of Iraq Petroleum Co., Ltd. When completed, the system will consist of two 12-in. and two 16-in. lines, one of each going to Tripoli and the other two terminating at Haifa. The four lines run parallel from Kirkuk to the K-3 pumping station, where the system divides

Pressure Vessels for Gas Absorption Plants require sound engineering



from START to FINISH



The slender, silver columns at a gas absorption plant may catch your eye first—but don't overlook the equally important high pressure processing and storage equipment. The amount of butane, propane, ethane and similar products successfully recovered and stored depends largely on the efficiency of these units. That's why the builder of gasoline plant equipment must have the engineering ability and fabricating facilities to do a thorough job—from start to finish.

How does CB&I measure up? Let's take storage first. Excessive evaporation losses occur if volatile hydrocarbons like butane are stored in conventional tanks. CB&I pioneered the design of a spherical container that prevents such losses. This container—the Hortonsphere—is particularly recommended for large volume storage. For smaller volumes, CB&I has furnished many cylindrical pressure tanks like those shown above.

What about fabricating facilities for pressure vessels and process equipment? CB&I shops do welding to code requirements, X-raying and stress-relieving. Special corrosion-resistant linings are furnished when specified. Facilities for plate heating enable us to build vessels at Birmingham, Ala., that withstand pressures up to 2,000 lbs. per sq. in.

From the starting design to the finished erection, CB&I is equipped to meet the exacting requirements of the petroleum industry. Write the nearest office for a quotation the next time you need storage or process equipment.

Upper right: Welding one of the heads for one of the four 12-ft. diam. horizontal pressure tanks shown in the group at the left.

Right: 10-ft. diam. by 20-ft. scrubber designed for a working pressure of 393 lbs. per sq. in. at 150 deg. Fahr. and tested hydrostatically at 615 lbs. per sq. in. pressure.

CHICAGO BRIDGE & IRON COMPANY

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Atlanta, 3.....2151 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 14....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg
Philadelphia, 3...1615—1700 Walnut Street Bldg.
Salt Lake City, 1..1525 First Security Bank Bldg.
San Francisco, 11..1254—22 Battery Street Bldg.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.

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Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
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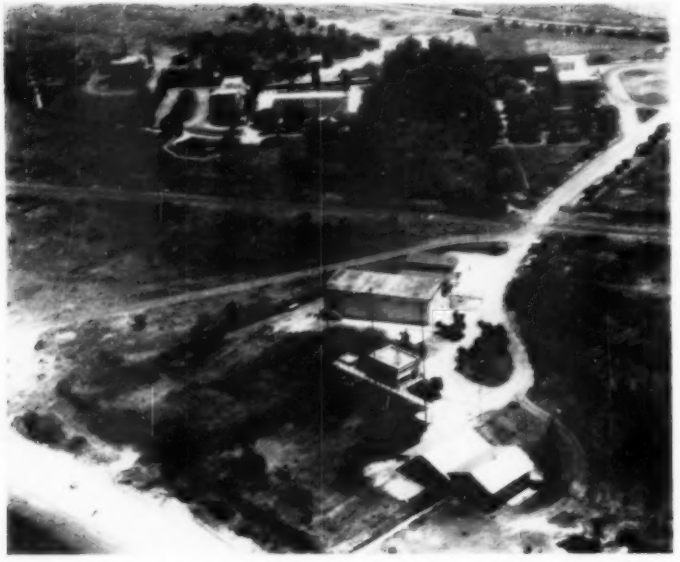

A portion of the Tripoli terminal, with the administration building shown at upper left and the marine station at upper right. In the heavily fenced foreground area on the beach may be seen a signal station

until October 1946 that construction was begun on two 16-in. lines, each of 90,000 bbl. per day capacity, to parallel the existing 12-in. lines.

The original plan was to complete first the 620-mile Kirkuk-Haifa line and later to build the 532-mile line to Tripoli. Laying of the Haifa line was completed to within 50 miles of the Haifa terminal by the spring of 1946, when the disturbed conditions in Palestine caused suspension of operations there.

Equipment, material, and workers then were transferred to the northern line, where the company concentrated its efforts on the 383-mile sector between the K. 3 pump station (see map) and Tripoli. Stringing commenced in May of 1948 and was completed a year later. Welding began in October of 1948 and was completed last July.

By utilizing the Kirkuk-K. 3 section of 16-in. line originally laid for the south line and using standby and temporary pumping equipment, it was possible to begin pumping through the 16-in. line to Tripoli in July.

I.P.C. was forced to suspend use of the original 12-in. line to Haifa in 1948, when considerable unrest in the country followed the action of the British Government in surrendering the Palestine Mandate.

Since then resumption of operations have been prevented by objections of the Iraq Government to the export of crude oil to Israel, although the refinery at Haifa began operating again this month, using imported Venezuelan crude oil.

I.P.C. now is preparing for the time when, with all facilities operating, the company will be pumping 270,000 bbl. daily through the system.

The pump stations between Kirkuk and the point where the lines diverge, west of K. 3, are being enlarged and reequipped with centrifugal pumps. Each station will have six motor-driven centrifugal pumps, each with a 156,000-bbl. daily capacity at 500 psi. They will be operated in pairs in series, with two pairs to provide the designed capacity and one pair as standby.

On the north and south lines west of K. 3 each pump station will be equipped with four reciprocating pumps, each of 50,000 bbl. daily capacity at 1,000 psi. The pumps are horizontal reciprocating units of the triplex double-acting type.

Increasing the capacity of the system has involved, in addition to laying the pipe and enlarging the pump stations, a heavy construction program, including additional tankage at each pump station and at the Tripoli terminal.

The terminals at Tripoli and Haifa originally were provided with 36 and 27 tanks, respectively, with each tank having a capacity of 93,000 bbl. At Haifa there is an oil dock with four berths, each capable of loading at rates of from 600 to 700 tons per hour. The terminal also operates four 12-in. sea lines.

The Tripoli terminal originally was furnished with three 12-in. sea lines to each of three berths situated 4,420 ft., 4,400 ft., and 4,470 ft. from shore. Loading capacity now is being increased by the installation of another loading line.

Increasing the capacity of the system also has necessitated additional construction at the desert pump stations along the routes.

On the original 12-in. lines the housing at each pump station included one or more houses for senior personnel; six 3-room houses for married engineers, a mess block with servants' quarters, a block of bachelor quarters, and a block of quarters for transients, and a large "service unit" containing departmental offices, water storage facilities, laundry, bakery, cold-storage units, and other facilities.

The service units were built with bastions at opposite corners, permitting them to be used as defense posts in the event of a disturbance.

Aerial view looking west at Kirkuk. In the foreground is the crude-stabilization plant. To the right of the tank farm in the background may be seen the K-1 pump station

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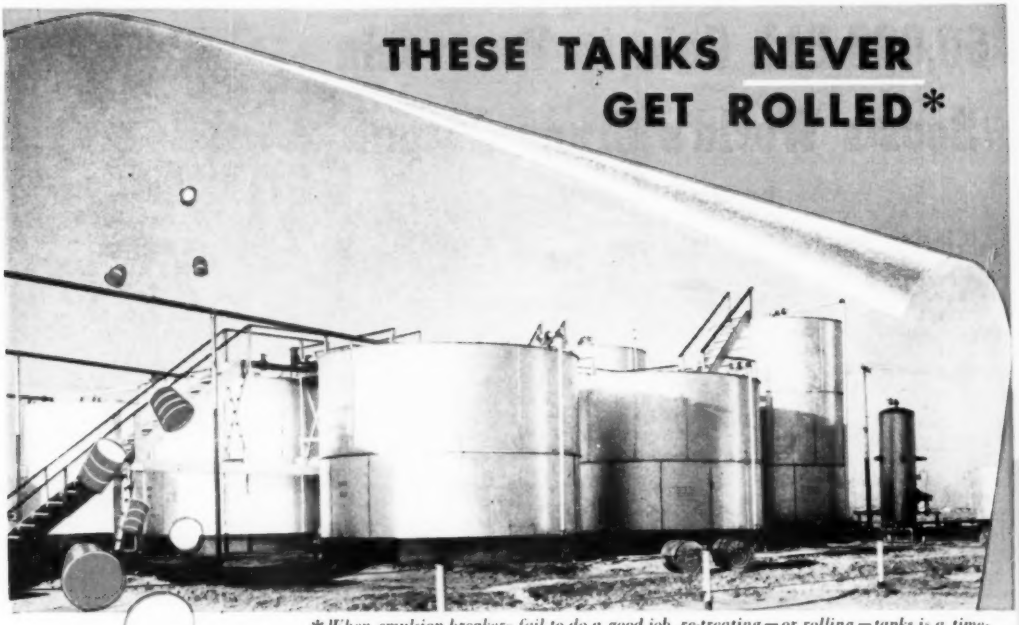

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60,000-Bbl. Gain in Venezuela Boosts World's Crude Output

by Dahl M. Duff

AN increase in Venezuela's output of 60,000 bbl. daily resulted in an over-all gain in total foreign crude-oil production during August.

Foreign crude production, exclusive of Russia and Eastern Europe, rose to 3,469 300 bbl. daily, an increase of 41,200 bbl. daily or about 1.2 per cent over July. With United States output up some 57,000 bbl. daily, indicated world production increased to 8,973,700 bbl. daily.

Venezuelan production in recent weeks has climbed even higher and, according to preliminary figures, reached a new all-time high the week ended September 26 with a daily average of 1,442,209 bbl. daily.

Winter demand for the heavy fuel-oil crudes produced in Venezuela is responsible for the sharp increases. The development is a complete reversal of the trend early this year when Venezuelan production dropped to a low point in March of 1,155,000 bbl. daily.

Figures of the Venezuelan Ministry of Fomento show the following (in barrels daily):

1947	1,191,000
1948	1,339,000
1949:	
January	1,245,000
February	1,229,000
March	1,155,000
April	1,200,000
May	1,292,000
June	1,296,000
July	1,318,000
August	1,378,000
Estimated: September	1,420,000

Weekly figures compiled within the ministry show the steady gains in production in September:

Week ended:	
September 5	1,384,784
September 12	1,414,515
September 19	1,434,312
September 26	1,442,209

The record reached September 26 is nearly 60,000 bbl. daily above the previous high of 1,382,718 bbl. daily in October of last year.

Reports from Venezuela are that the Shell organization has recently been producing at its full capacity of nearly 500,000 bbl. daily, while Creole Petroleum Corp., the country's No. 1 producer, still has about 25,000 bbl. daily shut in. This appears in part at least to reflect currency difficulties in world markets which adversely affect dollar sellers.

Creole's own production report for the month of August shows a daily average of 583,686 bbl. against 585,462 bbl. daily in July. Of the August total, 421,321 bbl. daily was from the Lake Maracaibo area, 3,872 bbl. daily from Cumarebo, and 158,493 bbl. daily from Eastern Venezuela.

As a result of the increase in Venezuela, crude production in the Western Hemisphere outside the United States in August showed an over-all gain of nearly 59,000 bbl. daily or about 3.2 per cent.

Production in Canada pushed up to a new high in August with 62,900 bbl. daily, 4,700 bbl. daily above the previous month. Mexico's output showed little change from July to August, but preliminary September figures showed a rise of nearly 10,000 bbl. daily to about 177,000 bbl. daily. Colombian production was off slightly in August.

Canada Hits New High

Production in Germany showed another of the series of slight increases which has characterized the trend in this country since early this year. August output was placed at about 17,600 bbl. daily. Several new discoveries in northwest Germany have encouraged producers in the area.

In the Middle East, the August production trend varied from country to country. The daily average for the entire area was down 16,800 bbl. from July to 1,321,900 bbl. in August. This is the lowest total Middle East production since before the first of the year.

Kuwait output declined sharply in August to a daily average of 190,500 bbl. daily. This is nearly 40,000 bbl. daily under the July figure, a drop of some 17 per cent. Iranian production also was off 23,900 bbl. daily to 543,400 bbl. daily.

Iraq production also was down. The August daily average was 103 000 bbl. daily. The July figure of 109,900 bbl. daily, was, however, a marked increase over the June daily average of about 76,000 bbl., due to the opening of the 16-in. pipe line to Tripoli.

Saudi Arabia showed an increase of 54,300 bbl. daily to 455,300 bbl. daily in August, a gain of about 14 per cent. The September figure, since announced, was 412 200 bbl. daily. Saudi Arabia's production for the first 9 months of the year averages 479,660 bbl. daily with runs in the Ras Tanura refinery in the same period averaging 133,565 bbl. daily.

CRUDE-OIL PRODUCTION
(Thousands of barrels daily)

Country—	August	Previous month
Western Hemisphere:		
Argentina	62.5	62.5
Bolivia	2.5	2.5
Brazil	0.1	0.1
Canada	62.9	58.2
Colombia	79.9	84.4
Cuba	0.5	0.6
Ecuador	7.5	7.5
Mexico	167.7	169.0
Peru	41.0	40.5
Trinidad	56.5	56.5
Venezuela	1,378.0	1,318.0
Total	1,859.1	1,800.2
Europe and Africa:		
France	1.0	1.2
French Morocco	0.4	0.4
Germany	17.6	17.4
Italy	0.2	0.2
Netherlands	11.3	11.3
Egypt	43.2	43.9
United Kingdom	0.9	0.9
Total	74.6	75.3
Middle East:		
Bahrein	29.7	30.1
Iran	543.4	567.3
Iraq	103.0	109.9
Kuwait	190.5	230.4
Saudi Arabia	455.3	401.0
Total	1,321.9	1,338.7
Far East:		
British Borneo	70.0	70.0
Burma	0.6	0.5
China	1.5	1.8
India	5.3	5.3
Indonesia (less New Guinea)	125.0	125.0
Japan	3.8	3.8
New Guinea	5.6	5.6
Pakistan	1.9	1.9
Total	213.7	213.9
Total, foreign less Russia and Eastern Europe	3,469.3	3,428.1
Russia and Eastern Europe:		
Albania	1.0	1.0
Austria	17.7	17.7
Czechoslovakia	0.9	0.9
Hungary	10.0	10.0
Poland	2.7	2.7
Romania	80.0	80.0
Russia	630.0	630.0
Yugoslavia	1.1	1.1
Total	743.4	743.4
Total foreign	4,212.7	4,171.5
United States	4,761.0	4,703.8
World total	8,973.7	8,875.3

TREND SINCE JANUARY 1, 1949

	W. Hemisphere less U.S.	Middle East	Foreign less Russia and E. Europe
January	1,706.4	1,358.2	3,308.6
February	1,688.6	1,400.2	3,340.2
March	1,625.9	1,393.4	3,280.2
April	1,678.2	1,485.2	3,448.3
May	1,768.5	1,417.6	3,472.8
June	1,768.8	1,375.7	3,433.3
July	1,800.2	1,338.7	3,428.1
August	1,859.1	1,321.9	3,469.3

The monthly production figures are authoritative for all countries in the Middle East and the more important producing countries in the Western Hemisphere and Europe. In some other cases estimates have been made based on the performance of preceding months. Figures in the column, "Previous month," do not agree in some instances with those heretofore published for July since revisions have been made due to subsequent information. Data for Colombia and Canada excludes condensate. No up-to-date figures are available for Russia and the Russian-dominated countries of Eastern Europe, and here the information is the latest obtainable. Other figures in the tabulation are from official government or company reports or reliable private sources.

Walter S. Hallanan, left, chairman of National Petroleum Council, with Ernie E. Pyles, president, San Joaquin Valley Oil Producers Association, center, and T. S. Petersen, president, Standard Oil Co. of California, at the annual fall meeting of the association

California Oil Men Told Federal Planners Must Be Thwarted

by Robert Harwick

BAKERSFIELD, Calif.—"The American oil industry is being sold down the river." Walter S. Hallanan, president of Plymouth Oil Co. and chairman of the National Petroleum Council, told the San Joaquin Valley Oil Producers Association here last week.

The sale, he said, "is being made by socialistic planners in Washington who seize the opportunities growing out of world economic dislocation and social distress."

The 300 men attending the association's annual fall meeting were told by Hallanan that the money of American taxpayers is being "lavishly used to build up European oil-producing and refining facilities in order to create surpluses in those foreign lands."

Only market for such surpluses, he continued, is the United States, and these subsidies financed by our government are causing "direct, unfair, and destructive competition with us," he declared.

Hallanan pointed to America's record of generosity, but warned that financing competition is "nothing more nor less than feeding the mouth that is biting us."

Calling on the oil industry to preserve its freedom and stability, he cited four specific threats against it. They are, he said:

"1. The use of the public treasury . . . to build up the oil production capacity of foreign nations.

"2. The encouragement of a flood of imports which, if continued on the scale now proposed, will destroy the stability of our American domestic industry.

"3. The seizure of the submerged tidelands from the states and the control of their vast reserves under a federal bureaucracy.

"4. The complete control of the oil industry by the federal Government through the enlargement of powers of the Federal Power Commission to regulate natural gas at the well head and subject it to the whims and decrees of those whose sole aim is to nationalize the petroleum industry."

Preceding Hallanan's talk, Ernie Pyles, association president, reviewed the stand of the association in matters affecting the welfare of the California oil industry.

Pyles said protests have been sent to Washington against the proposed loan to Mexico. The association also is not in accord with the planned 5 per cent limit on petroleum imports, he said.

Pointing out that California can and does produce 20 per cent of the nation's petroleum needs and has about 10 per cent of the population, he said oil imports into California are strongly opposed.

T. S. Petersen, president of Standard Oil Co. of California, presented production and market figures for California, stressing the need for production curtailment in the state.

Petersen's figures show that the California export market now is practically zero, while it once was, about 10 years ago, better than 150,000 bbl. daily.

Stocks, he continued, have accumulated in California at an alarming rate. A little more than 4 months ago, he said, 18,000,000 bbl. of crude and products were in storage. In spite of shut-ins, these stocks have increased another 11,000,000 bbl., he asserted.

He described the situation as "very serious" and said production cuts of 90,000 bbl. daily, bringing California production to around 800,000 bbl. daily, would be required to stabilize the California market.

Continental to Move Officials to Houston

PONCA CITY, Okla.—Continental Oil Co. will transfer to Houston early in 1950 six officers of the company and two department heads who have previously headquartered in Ponca City, President L. F. McCollum announced October 17.

The group to be transferred, including members of their immediate staffs, will total about 60 employes, he said.

Officials who will move to Houston are W. C. MacMillan, executive vice president; Harry J. Kennedy, vice president in charge of marketing; R. L. Bosworth, financial vice president; Serge B. Jurenev, vice president in charge of coordination and planning; A. W. Tarkington, treasurer; and Thomas F. Dowd, controller.

Department heads who will transfer are W. E. Webb, manager, production department, and John Post, manager, industrial-relations department.

Transfer of this group of officials to Houston is considered to be "essential to the best economic and competitive advantage of Continental Oil Co.," said McCollum.

Humble Completing World's Second Deepest Producer

HOUSTON. — Second deepest producing well in the world is being completed by Humble Oil & Refining Co. in the Lake Raccourci field, Lafourche Parish, Louisiana.

Humble's 1 State 1452 flowed 179 bbl. of 48.4°-gravity condensate and 4,123 M.c.f. of gas daily through perforations from 14,434-467 ft.

Present holder of the world record for production is the Standard Oil Co. of California. Its 5 Mushrush in the Wesco field of Kern County, California, is producing from the interval 15,250-530 ft. This well was completed only a little over a month ago.

D. A. HULCY

R. W. HENDEE

Offshore Gas to Stay There Until Price Rises, A.G.A. Told

CHICAGO.—Cooking with gas and drilling for oil are opposite ends of the fuels spectrum, but the gap is constantly narrowing. The extent to which the city-gas business is borrowing from and becoming dependent on the oil industry was apparent here this week when 5,000 persons representing all branches of the gas industry gathered for the annual convention of the American Gas Association.

Scattered through the program were several technical discussions of the growing number of processes for manufacturing gas from oil instead of from coal; hints of how the gas industry may be affected by current experiments with synthetic fuels; reports on production of chemicals from both oil and gas; discussions on the place of L.P.G. in the gas industry.

Beneath the waters of the Gulf of Mexico lie untapped gas reserves which sooner or later will find their way into the homes of northern and eastern cities, was the prediction of two exploration engineers of Magnolia Petroleum Co., Dallas—Henry C. Cortes and R. N. Gsell. Oil drillers will find the gas and pipe liners know how to get it ashore, but its utilization depends on economics because its cost will be higher than gas now produced from the shoreward side of the beach.

Large subsea gas reserves have not yet been proven from the engineer's standpoint, but by conventional computing methods which they said are in the realm of reason the two engineers estimated that the 11 gas discoveries off the Louisiana coast may total 2 trillion cubic feet, and ultimate discoveries may be two to four times that.

The technology of laying pipe lines to offshore gas wells has been established by successful underwater lines in many parts of the world, they declared, and application to the Gulf Coast awaits firming up of the reserve estimates and a price sufficiently above prevailing onshore field prices to justify the higher production and gathering costs.

"Dust to Dust"

Just as the oil industry learned that the admonition "Dust thou art, to dust returneth" applies to pipe lines, so the gas industry must learn to protect its underground installations against soil corrosion, it was warned by Pat H. Miller of Texas Eastern Transmission Corp., Shreveport.

Citing examples of how leaks have cost far more than adequate protection would have cost, Miller said management must be made to realize that cathodic protection, like life insurance, increases in cost as the age of the pipe line advances and that the time to stop leaks is before they start.

How the gas industry must split its radio channels with the oil industry on the one hand and the utility industry on the other was explained by W. T. Bulla of Natural Gas Pipeline Co. of America, Chicago. At the direction of the Federal Communications Commission, committees of the two industries are preparing a reallocation of wavelengths needed for the many communications uses of the companies, with the production and transmission uses of the gas industry coming under the petroleum committee and the distribution phases under the utilities group.

Under the A.G.A. policy of alternating its top officials between representatives of the natural and manufactured-gas branches, Hugh H. Cuthrell, vice president of Brooklyn Union Gas Co., became president of the association, succeeding Robert W. Hendee, president of Colorado Interstate Gas Co. D. A. Hulcy, president of Lone Star Gas Co., advanced from second to first vice president, presumably to move into the top chair a year hence.

Symposium on Promising Oil Areas Planned by A.A.P.G.

The American Association of Petroleum Geologists has taken the first step in a program that may ultimately result in an up-to-date revision of it's famous publication "Possible Future Oil Provinces of the United States and Canada."

A symposium on promising areas in these two countries will be held as part of the annual meeting of the society next spring. Max W. Ball, well-known geologist, is chairman of the committee which is supervising the work of subcommittee groups in various parts of the United States and Canada. Each subcommittee group will present a paper on promising territory within their area at the spring meeting in Chicago.

Many Subjects on Agenda Of Fall Meeting of NPC

WASHINGTON.—Currency devaluation, imports, and the British-American oil talks are expected to be the major subjects of discussion at the quarterly session of the National Petroleum Council, to meet here October 25.

A number of other subjects, however, are expected to come up, possibly including a discussion of the residual situation, on which an NPC study may be requested by the Interior Department; the mineral leasing proposals; and the Harris bill to set up a petroleum-policy council.

The imports committee will have a statistical report; the committee on industry manpower is expected to make an interim report; an authoritative analysis of the situation created by the recent devaluation of the British pound and other currencies is scheduled to be made by Walter J. Levy, former chief of the ECA petroleum branch; and Dr. Oscar E. Bransky, present acting director, may report on European Recovery Program oil developments.

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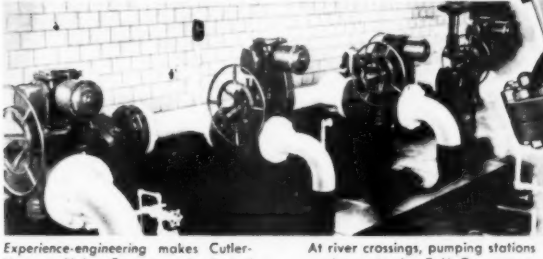

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Practical Problems of Gasoline Plants Discussed by N.G.A.A.

TYLER, Tex.—Many of the operational problems common to natural-gasoline plants were discussed on a practical basis here October 14 at the southern regional meeting of the Natural Gasoline Association of America. Jointly sponsored by the N.G.A.A. and the East Texas Natural Gasoline Men's Club, the 1-day meeting consisted of two technical sessions.

Under chairmanship of W. A. Bowser, Atlantic Refining Co., Dallas, the morning session included four papers dealing with subjects on equipment maintenance and field processing-plant personnel. Causes and methods for combating corrosion were discussed in the paper "Corrosion in Gasoline Plants" by John H. Naschke, Humble Oil & Refining Co., Houston. E. H. Flaherty, Clark Brothers Co., Olean, outlined, in his paper on compressors, the principal factors of adequate lubrication of equipment of this type.

Training Emphasized

Proper operation and maintenance of the cooling tower and its auxiliary equipment was shown by Neal B. Laubach, Hudson Engineering Co., Houston, to lead to higher plant efficiencies. In his talk on personnel training, also given during the morning session, M. V. Cousins, United Gas Co., Shreveport, outlined the basic personal knowledge necessary for a training supervisor to secure before he could actually begin to lay out a training program. With this knowledge at hand the supervisor could then set up the program, generally under these divisions.

1. A working knowledge of the various cycles and processes carried on in the plant.

2. The operation of the various individual pieces of mechanical equipment that cause the cycles and processes to function.

3. The routine operation of the plant; starting up and shutting down, the constant checking, adjusting controls, testing and recording results that are an essential part of plant operation.

4. Actions to be taken in emergency situations such as fires or breaks.

As a conclusion to his discussion, Cousins said: "You can design plants in accordance with physical laws to have great efficiency. You can design control equipment that under normal circumstances will maintain optimum conditions. You can construct your plant of the best materials and to the highest standards. But, much of the effectiveness of your plant—possibly your margin of profit—will be lost if at the same time you do not develop a group of employes who have the ability to operate and maintain the plant and the desire to do the best job possible."

Technical subjects discussed at the afternoon session, with W. H. Harts, Warren Petroleum Corp., chairman, included instrument application and explosions in air starting systems. Talking on the practical side of field processing plant instrumentation and particularly with regard to their selection, C. F. Woods, Brown Instruments Division, Dallas, said, "Each instrument should be considered individually, with full thought centered on the job expected of it, under the condition imposed upon it. Only by so doing will you be able to select the right instrument for each job and the right instrument is the best instrument."

On behalf of the instrument manufacturers' efforts to keep abreast with the rapid developments in natural-gas processing, Woods said the instrument makers are anxious to supply the needs of the gasoline plant industry. "These manufacturers have tried to keep pace with the demands for new and better tools, and have tried where possible, to lead the way towards the acceptance of improved and possibly unique methods of measurement and control. The instrument makers produce a wide variety of types and models, built not only to serve this industry, but also to serve the whole broad field of industrial instrumentation," he said.

Carney Is Speaker

B. R. Carney, Warren Petroleum Corp., Tulsa, discussing the natural-gasoline manufacturers' current economic problems at the afternoon session, made the summary statement: "It seems likely that 26-lb. natural may tend to stabilize at somewhere near or a bit below the average value of crude oil. True, compared with crude, natural's cost of conversion to finished products is small, but there is the offset of higher transportation costs, and the costs of storage to meet periods of peak demand in the winter. And the industry will have the continuing problem of selling its growing output even at that level." Carney went on to point out a number of things which are being done to ease the supply-price situation. He also suggested other courses of action open to the industry for improving its economic status.

James E. Pew, president, Natural Gasoline Association of America, gave an address on governmental affairs. The title of Pew's talk was "Free Men Forging Their Own Chains."

Next Week

Economical gasoline-plant design.—C. F. Sanderson and A. S. Glendening of the Houston consulting firm bearing their name, present an interesting discussion of this subject. They show that proper design can effect considerable saving when the engineering is guided by the economics of specific requirements; the discussions include low-pressure absorption, high-pressure absorption, low-temperature recovery, and vapor-rectification processes.

Rating gas wells.—Sol Smith, consulting engineer, Austin, Tex., gives test procedures and "pointers," and discusses application of the **deliverability method** of gaging gas wells.

Cooling towers.—Their operation and maintenance are detailed by Neal B. Laubach, manager, cooling-tower division, Hudson Engineering Corp.

The "balanced" rotary rig.—C. H. Oberg, drilling engineer, Standard Oil Co. of California, continues his discussion of drilling equipment; rig layouts and equipment for specific depths and hole sizes are detailed.

Pressure maintenance.—Description is given of Sun Oil Co.'s new pressure-maintenance plant in Jameson field, West Texas, from an on-the-spot visit by D. H. Stormont, Journal district editor.

New wax plant.—Features are covered for this new manufacturing facility of Shell Oil Co. at Houston. Ultimate throughput will be 40,000 tons per year; solvent process is used.

Greases.—Digests of a number of the papers given before the National Lubricating Grease Institute's Seventeenth annual meeting, New Orleans.

Oil findings.—Digests of papers from American Association of Petroleum Geologists-Society of Exploration Geophysicists regional meeting, Biloxi, Miss.

PERSONALS

Sealey Has Had 30-Year Career With Texas Co.

F. C. SEALEY, who was recently elected vice president in charge of exploration and production for Bahrein Petroleum Co., Ltd., is a Colorado School of Mines graduate who worked up through The Texas Co. organization from geologist in North Texas to assistant to the vice president in New York.

The Texas Co. is one of the parent companies of the Caltex - Bahrein group which Sealey joined in July with his election as vice president. Continuing his headquarters in New York, he is also executive vice president of American Overseas Petroleum Co.

Sealey was born and educated in Denver and graduated from Colorado School of Mines with the degree of engineer of mines.

In 1917 he entered the service of Producers Oil Co. as assistant geologist, serving in Wyoming and Montana. After Army service in World War I, he joined The Texas Co. as geologist in North Texas.

In 1919 Sealey was assigned as geologist with a reconnaissance group which made an 8-month trip through northern Peru.

He was made assistant manager of the South Texas division of production in 1929 and became division manager in 1933. In January 1937 he went to Los Angeles as manager of production and in July 1938 he transferred to the New York office, producing department. In 1939 he became manager of foreign producing operations, and in November 1948 was made assistant to the vice president, foreign operations, serving in that capacity until his recent election with the Caltex-Bahrein group.

D. H. Brown has been named assistant superintendent of compressor stations for Lone Star Gas Co., succeeding **T. J. Skrabanek,** who recently was named superintendent of compressor stations. Brown joined the company in 1939 and was named control engineer for the company in 1946.

R. V. Mertz, supervising engineer at Stanolind Oil & Gas Co.'s North Cowden plant, Denver, has been transferred to the company's Levelland, Tex., plant as engineer.

W. M. O'Reilly, field engineer for Humble Oil & Refining Co., at Lolita, Tex., has been moved to Houston as associate petroleum engineer.

Robert F. Owens, formerly production engineer and supervisor for Gulf Oil Corp. at Bushton, Kans., has joined Central Oil Co., Tulsa, as superintendent of production.

J. B. Tooke, who has been serving as production foreman at Kountz, Tex., for Pan American Production Co., has been named production foreman for the East Texas-North Louisiana district, with headquarters in Kilgore, Tex. **E. F. Fullen,** formerly district superintendent in East Texas and North Louisiana, has been moved to the Kountz office.

George H. Daggett, of Andrus, Lent & Daggett, Bradford, Pa., has been elected a director of Pennsylvania Grade Crude Oil Association. Others elected include: **MacLean Houston,** United Refining Co., Warren, Pa., and **W. H. Millhiser,** Waverly Oil Works Co., Pittsburgh.

Nils B. Bengston, formerly assistant mechanical superintendent at Esso Standard Oil Co.'s Everett, Mass., refinery, has been named mechanical superintendent, succeeding **Alvin C. Killinger,** retired. **Arthur A. Corcoran,** former chief engineer, was named Bengston's assistant.

Robert L. Rowan, of the firm Rowan & Buchanan, Houston, has been elected chairman of the South Texas section, American Society of Mechanical Engineers. Other officers are: **J. P. Warren,** Dow Chemical Co., Freeport, vice chairman; and **James H. Howard,** of Howard, Johnson & Kelley, consulting engineers, secretary-treasurer.

William H. Rowland, Jr., formerly superintendent of Creole Petroleum Corp.'s La Salina, Venezuela, refinery and more recently technical assistant in Esso Standard Oil Co.'s Bayway cost-analysis division, has been appointed cost analyst at Bayway.

Noah Andrews, Union Rotary Corp., has been elected a director of Oil and Gas Association of Michigan. Other directors elected are: **T. Glen Caley,** Basin Oil Co.; **Hugh Crider,** Muskegon Development Co.; **Crawford Daily,** Daily Crude Oil Co.; **Charles C. Goforth,** Gulf Refining Co.; **I. W. Hartman,** independent; **O. H. Kristofferson,** independent; **H. J. Lowe,** Pure Oil Co.; **E. Allen Morrow,** Roosevelt Oil & Refining Corp.; **G. F. Stewart,** Stewart Oil Co.; **H. L. Wadsworth,** independent; **J. V. Wicklund,** Mogul Oil Co.; and **Harold Wright,** Cities Service Oil Co. **James E. Spindle,** Michigan Consolidated Gas Co., was elected to the board for the term expiring in October 1950.

A. A. O'Kelly, associate director of the research and development department, Socony-Vacuum Oil Co., Inc., has been elected chairman of the division of petroleum chemistry, American Chemical Society, and **Dr. Bernard H. Shoemaker,** assistant director of research for Standard Oil

A. A. O'KELLY

B. H. SHOEMAKER

Co. (Ind.) has been chosen chairman-elect of the petroleum division, A.C.S. O'Kelly, a graduate of University of Arkansas in 1926, received his Ph.D. in chemistry 3 years later at University of Colorado. He went to Paulsboro, N. J., in 1935 as research chemist and in January 1944 was named supervising chemist in charge of chemical research. He was elevated to his present position with the company in 1947. Shoemaker has been a member of Indiana Standard's research staff since 1930. After appointment to various supervisory positions, he was made assistant director of research in 1946. He graduated from Hope College in 1925 and received his Ph.D. in organic chemistry from Ohio State University in 1930. **C. G. Kirk-**

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bride, Houdry Process Corp., was named secretary-treasurer of the division, and the following were named to the executive committee: **A. L. Lyman,** California Research Corp.; **H. M. Smith,** U. S. Bureau of Mines; **Louis Schmerling,** Universal Oil Products Co.; **W. A. McMillan,** The Texas Co.; **C. L. Brown,** Standard Oil Development Co.; **S. W. Ferris,** Sun Oil Co.

Jack Lavin, who retired from Shell Oil Co. 2 years ago, will soon go to New Zealand where he plans to investigate oil possibilities there and in several Australian areas.

Paul Quillin has been transferred by Sohio Petroleum Co. to Owensboro, Ky., where he will be assigned to the company's water-flood division. He formerly served as engineer in the Oklahoma City office.

Emanuel H. Shoemaker, formerly engineer at Carter Oil Co.'s new Billings, Mont., refinery, has been transferred to Standard Oil Development Co. as construction engineer, and will go to Antwerp, Belgium, as resident engineer of the Benelux refinery, now being erected.

Marlin R. Taylor, production engineer at Hobbs, N. M., for Gulf Oil Corp., has been transferred by the company to the Centralia, Ill., area as production engineer.

J. E. Moreland, Jr., who formerly was in charge of the core laboratory for Cities Service Oil Co. at Bartlesville, Okla., has been transferred to Oil Hill, Kans., where he will serve as production field engineer.

E. D. Maihous, Barnsdall Oil Co., Elton, La., has been moved by the company to Snyder, Tex., where he will serve as production foreman.

Karl Bushler, J. G. Mitchell, and **J. E. Guyer** have formed Canadian Stratigraphic Service, with headquarters in Calgary, Alta. The firm is a branch of Denver Sample Log Service, Denver, and Mitchell, formerly a geologist with Pure Oil Co., will be in charge, assisted by **J. T. Humphries,** formerly geologist with Alberta Petroleum and Natural-Gas Conservation Board.

L. W. McLennan, Union Oil Co. of California, and **R. Cubicciotti,** of L. Sonneborn & Sons, Inc., have been elected to the board of directors of National Lubricating Grease Institute. **A. J. Daniel,** Battenfield Grease & Oil Corp., was named president; **Howard Cooper,** Sinclair Refining Co., vice president; and **E. V. Moncrieff,** Swan-Finch Oil Corp., reelected treasurer.

C. L. Burrill, formerly in charge of budgets for Standard Oil Co. (N. J.), has been elected a director of Creole Petroleum Corp.

H. M. Goodman, geologist at Houston for Shell Oil Co., has been transferred to the Midland, Tex., area in the same capacity, and **R. J. Graf,** formerly seismologist party chief at Gainesville, Tex., has been transferred to the Greeley, Colo., area.

W. H. Stockton, district superintendent in charge of production and maintenance for Pure Oil Co. at Mexia, Tex., has been transferred in the same capacity to the Carroll district, Van, Tex., while **Melburn R. Mullins,** chief gager for the company at Alief, Tex., has been transferred to Thibodaux, La.

F. D. Damon, who formerly served as Oklahoma district geologist for Macmillan Petroleum Corp. at Shawnee, has been named geologist for Big Chief Drilling Co., Oklahoma City, and will be in charge of that firm's geological department.

D. W. Rogers, tool pusher at Tyler, Tex., for Delta Drilling Co., is now serving as tool pusher for the company in the Lisbon field.

Ralph E. Schneider, formerly at Roswell, N. M., for The 36 Co., has been transferred to Edwardsville, Ill., in charge of drilling tests in that state.

J. N. Byler is now serving as chief station engineer for Texas Eastern Transmission Corp. at Oakland City, Ind. He formerly was stationed in the Anna, Ill., office.

Philip H. Marsh, engineer for Honolulu Oil Corp. at Taft, Calif., has been named engineer at Santa Fe Springs, Calif., for Rothschild Oil Co.

Louis Taylor, geologist for Richfield Oil Corp., has been transferred from Long Beach, Calif., where he served as paleontologist, to Ventura.

Edward F. Shea, senior geologist, Stanolind Oil & Gas Co., Tulsa, has been nominated for the position of secretary-treasurer of American Association of Petroleum Geologists. He has been with Stanolind since 1931, and was with the old Dixie Oil Co. prior to that time.

E. C. Bromley, tool pusher for Scott Drilling, Inc., at Ludington, Mich., is now serving as tool pusher in the Reed City, Mich., area.

Roy E. Potts, staff engineer at Whiting, Ind., for Standard Oil Co. (Ind.), is now on leave attending Yale University Law School, New Haven, Conn. He formerly was engineer in the light-oil design division.

Thomas H. Lawrence has been named assistant to **Harry Moreland,** president of Great Lakes Pipe Line Co. His appointment, together with the election of **John L. Auch** as a vice president, which was announced last

T. H. LAWRENCE

JOHN L. AUCH

week, increases the administrative staff of the company. This was necessary due to expansion of the company and its products pipe-line system. Lawrence is a graduate of Yale University, and formerly was with Hall Bros., Inc., Kansas City. Auch was formerly a vice president of Pittsburgh Consolidation Coal Co. Great Lakes Pipe Line Co. is now engaged in a $55,000,000 expansion program which will double the throughput capacity of its system.

John O. Galloway has been named temporary chairman of the Western Canada Geophysical Society, now in process of organization in Alberta. Headquarters are in Calgary.

W. H. Johnson, tool pusher at Victoria, Tex., for Carl Short, Inc., is now serving as driller for that firm in the Lindsay, Okla., area.

C. H. Austin, producing foreman for Montex Drilling Co. at Brownfield, Tex., has been transferred to the Fort Worth area.

L. B. Culligan, geologist for California Co. at Escalante, Utah, has been transferred to New Orleans as development geologist.

R. E. McClintock, tool pusher for Rocky Mountain Drilling Co. at Taft, Calif., has been transferred in the same capacity to Elk Hills, Calif.

R. L. Galloway is now serving as geophysical party chief for The Texas Co. at Laurel, Miss. He formerly was located in Jackson, Miss.

M. S. Patton, Jr., division engineer, Gulf Coast region, Sunray Oil Corp., Alice, Tex., has been moved to Mid-

PERSONALS

land, Tex., as engineer for the North and West Texas division.

Forrest L. Fry has been assigned as tool pusher at Gillette, Wyo., for Noble Drilling Corp. He served in a similar capacity in Rock Springs, Wyo., before being transferred.

Carl W. McHenry, drilling and production foreman in charge of the Kansas District for Anderson-Prichard Oil Corp., headquartered at Great Bend, Kans., has been transferred to Perry, Okla., as district foreman in charge of producing operations.

Louis B. Kellett has been named district geologist for Kerr-McGee Oil Industries, Inc., in West Texas, succeeding **Robert F. Myer,** who resigned to become a consulting geologist.

Richard A. Aukerman, district exploitation engineer for Shell Oil Co. at McPherson, Kans., has been transferred to Wichita, where he is responsible for exploitation engineering functions covering the area formerly known as the McPherson Headquarters. This office was abolished and the area incorporated under the Great Bend, Kans., headquarters, which now includes all of Kansas.

Joseph H. Salmon, assistant to the president, Shell Oil Co., has resigned from company service. He had been associated with the Shell organization for 27 years.

SHIFTS—

M. J. Taves, engineer, Richfield Oil Corp., Bakersfield to Los Angeles; **Jim R. Thomas,** engineer, Texas Railroad Commission, Lamesa to Midland, Tex.; **Robert M. Lowe,** engineer, Sohio Petroleum Co., Fort Worth to Oklahoma City; **C. B. Hubbard,** engineer, Humble Oil & Refining Co., Freer, Tex., to Houston; **J. W. Austin,** engineer, Stanolind Oil & Gas Co., Houston to Alvin, Tex.; **William P. Harvey,** geologist, Geophysical Service, Inc., Dallas to Crosbyton, Tex.; **J. S. Newcomb,** refinery superintendent, Sunray Oil Corp., Odessa to Forsan, Tex.; **Bob Mellon,** refinery engineer, Gulf Oil Corp., Port Arthur, Tex., to Pittsburgh.

Robert H. Parks, engineer, Sunray Oil Corp., San Antonio to Tulsa; **Charles E. Davis,** geologist, Gulf Oil Corp., Wickett to Crane, Tex.; **P. G. Williams,** superintendent, Pure Oil Co., Cameron to Morgan City, La.; **Laurence N. Dexter,** superintendent, Atlantic Refining Co., Lake Charles, La., to Houston; **O. N. Goode,** engineer, Magnolia Petroleum Co., Lake Charles, La., to Luling, Tex.; **Fred M. Hill, Jr.,** engineer, Union Producing Co., Monroe, La., to Pasadena, Tex.; **Virgil P. Harris,** engineer, Barnsdall Oil Co., Lewisville to Patmos, Ark.

W. K. Sanders, superintendent, Panhandle Eastern Pipe Line Co., Kansas City, Mo., to Liberal, Kans.; **Charles S. Richard,** engineer, Socony-Vacuum Oil Co., Holmes, Pa., to North Plainfield, N. J.; **J. B. Whisenant,** engineer, Whisenant & Trenchard, Golden, Colo., to Fort Worth; **Lindell H. Van Dyke,** superintendent, Shell Oil Co., Pueblo, Colo., to Emporia, Kans.; **B. I. McClune,** Cities Service Oil Co., Fredonia to Madison, Kans.; **Preston G. Rennie,** engineer, Sohio Petroleum Co., Gorman to Russell, Kans.; **Richard A. Aukerman,** engineer, Shell Oil Co., McPherson to Wichita, Kans.

R. G. Barnes, engineer, Stanolind Oil & Gas Co., Stafford to Lyons, Kans.; **Charles W. Delancey,** consulting engineer, Houston to Rogers, Ark.; **I. T. Pryor, III,** engineer, Humble Oil & Refining Co., Tyler to Talco, Tex.; **Clifton Cowan,** Union Oil Co. of California, Shreveport to Jackson; **D. L. Farley,** geologist, McKamie Gas Cleaning Co., Waldo to Stamps, Ark.; **J. B. Vaughan,** geologist, Ashland Oil & Refining Co., Henderson, Ky., to Evansville, Ind.; **B. J. Smith,** engineer, Humble Oil & Refining Co., Brookhaven, Miss., to New Orleans; **W. W. Jones,** geologist, Plymouth Oil Co., Sinton to Texon, Tex.; **R. R. Barr,** Shell Oil Co., Inc., Kemp to Freer, Tex.; **J. B. Tooke,** Pan American Production Co., Kountze to Kilgore, Tex.

E. P. Coperhauer, superintendent, Newman Brothers Drilling Co., Alice to Sweetwater, Tex.; **Mark S. Patton, Jr.,** engineer, Sunray Oil Corp., Alice to Midland, Tex.; **E. F. Fullen,** superintendent, Pan American Production Co., Kilgore to Kountze, Tex.; **Donald L. Henderson,** engineer, Lubbock to Midland, Tex.; **James E. Dennis,** geologist, Standard Oil Co. of Texas, Midland to Amarillo, Tex.; **H. B. Smyrl,** Petty Geophysical Engineering Co., San Antonio to Sonora, Tex.

DEATHS

Samuel Hay Wallace, 60, managing director of Caltex (Africa), Ltd., died in Cape Town, South Africa, October 9. A graduate of Stevens Institute of Technology, Wallace joined The Texas Co. in 1913 and had spent many years in the foreign operations side of oil distribution.

Tearl Leroy Hill, 56, with Warren Petroleum Co. at Breckenridge, Tex., died October 14.

Joseph T. Lockwood, Jr., 56, manager of the foreign shipping department of Socony-Vacuum Oil Co., Inc., died October 11 in New York.

Albert G. Hochuli, 51, assistant manager of the Boston division of The Texas Co., died October 12 in Boston.

P. L. Love, owner of Love Petroleum Co., Jackson, Miss., was killed in an automobile accident October 13.

Antonio M. Amor, assistant managing director of Petroleos Mexicanos and formerly general manager in charge of the Northern Zone, died October 6 in Mexico City. Amor was in charge of production and technical matters for Pemex.

Eddie Cooper, employe at Shell Oil Co.'s gasoline plant near Lucien, Okla., was killed in an explosion at the plant October 10.

Earl Harder, Sr., 51, Urania, La., pioneer oil operator and owner of Harder Drilling Co., died October 10.

M. E. Ware, 53, land supervisor for Tennessee Gas Transmission Co., Houston, died October 6.

Nathan B. Chenault, Jr., 34, southern Illinois district superintendent for Sohio Petroleum Co., died October 14 from injuries received in an automobile accident near Sims, Ill.

Joseph H. Senior, 79, executive in the Standard Oil Co. (N. J.) organization prior to his retirement in 1933, died October 16 in Langhorne, Pa. He had been president of Pan-American Oil Export Corp., Penola, Inc.; Standard Oil Co. of Brazil; Standard Oil Co. of Cuba; Standard Oil Co. of Pennsylvania, and West India Oil Co.

J. C. Ulmer, 67, Kilgore, Tex., drilling and producing superintendent of the Rogers Lacy estate, died in Shreveport October 14 from injuries received in an automobile accident near Carthage, Tex.

Frank Britton, 60, Brownwood, Tex., independent oil operator, died in Fort Worth October 12.

Landmon P. Rush, 29, tool pusher for Miller & York at Bakersfield, Calif., was killed in an automobile accident near Gorman, Calif., October 9.

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When do we Need A SYNTHETIC-FUEL INDUSTRY?

by A. L. Solliday

A. L. SOLLIDAY

Executive vice president, Stanolind Oil & Gas Co., Tulsa. Summarization of paper given at A.I.M.E. fall meeting, San Antonio, October 6.

1. **Synthetic fuels will appear only when they can compete with petroleum products.**
2. **Using present designs, the motorist would have to pay 15 to 20 cents more per gallon for synthetic gasoline.**
3. **The country's net demand for oil will rise to 8,400,000 bbl. of petroleum per day by 1965; by 1975, to 9,100,000 bbl. (5,900,000 bbl. per day during 1949).**
4. **On the supply side of the picture, domestic onshore and offshore petroleum reserves equal 113 billion barrels (37 billion barrels produced so far).**

SYNTHETIC fuels from coal and oil shale cannot compete in today's market. Inasmuch as they are not now economical, recent proposals have recommended that the Government subsidize a synthetic-fuels program. The proponents of such a policy state that such a program is justified as a security measure.

After thorough study, we believe that the nation should **not** enter into a synthetic-fuel construction program now. The nation is in no danger of a liquid fuel shortage in the near future. As a matter of fact, supplies of oil will probably be great enough to make such a program unnecessary for at least another 10 years. Even in the case of war, supplies of liquid fuels should be adequate without turning to coal or oil shale before 1961.

Stanolind Oil & Gas Co. recently completed an analysis of the current competitive position of liquid fuels from coal and oil shale as compared to those from oil and gas. The background for this analysis has included several years' extensive research work on synthetic fuels at Stanolind's laboratories.

The results of Stanolind's analysis have been published in the paper, "Liquid Fuels From Coal and Oil Shale," which appeared in the September 15, 1949, issue of The Oil and Gas Journal.

Stanolind's studies together with a

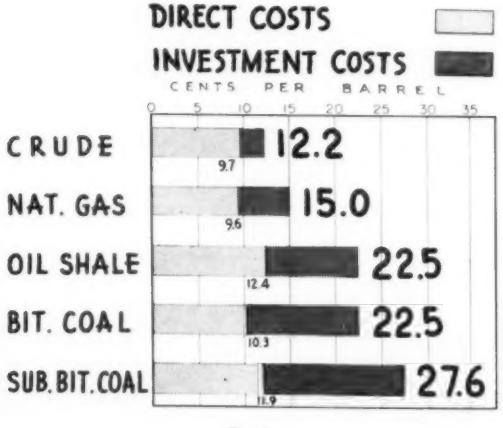


Fig. 1

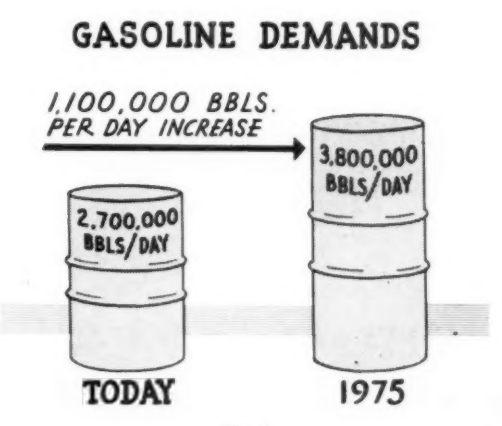


Fig. 2

TOTAL DAILY U.S. DEMAND FOR PETROLEUM

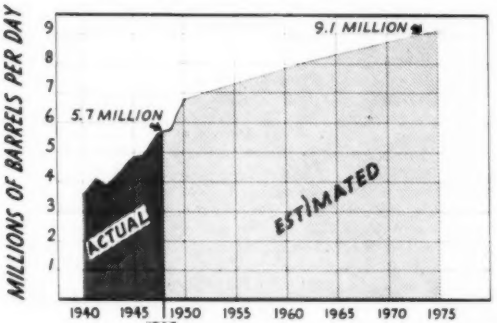


Fig. 3

COMPARISON OF FORECASTS OF U.S. DAILY DEMAND

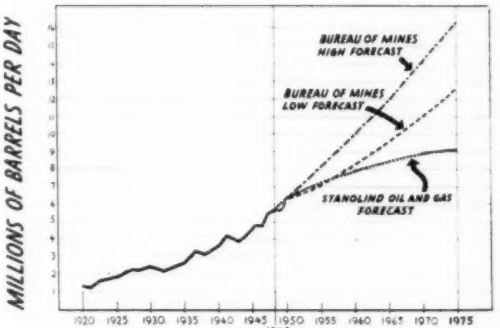


Fig. 4

thorough survey of all available information show that the production of liquid fuels from natural gas, coal, and oil shale is technically feasible. The technology of synthesis from natural gas is already highly developed. As a matter of fact, a commercial synthesis plant of this type is now nearing completion near Brownsville, Tex. However, technical progress on synthesis of coal and oil shale has not advanced as far. These processes still remain in an immature state of development.

Studies of cost, alse reported in that article, show that liquid fuels from coal and shale cannot compete successfully with products from petroleum in today's market (see Fig. 1). These costs were based on processes considered to be technically feasible today. They include costs of mining, manufacture, and transportation. The **direct** costs of making a gallon of gasoline from these raw materials are not far different.

Direct costs, however, alone do not provide a true basis for comparison. To do so, it is necessary to include charges for depreciation and profit. A reasonable return on investment would be 14 per cent a year. This return would take care of depreciation and allow an income after taxes sufficient to pay off the investment in 10 years. In plants of this type, with such a high obsolescence factor at this stage of development, a 10-year payout period would certainly not be unreasonable. When these investment charges are added to direct costs, the total costs of liquid fuels vary considerably (see Fig. 1). On this basis, gasoline from crude would cost 12.2 cents per gallon, and that from natural gas would be 15 cents. But costs for oil shale and bituminous coal would rise to 22.5 cents a gallon, while that from subbituminous coal would go up to 27.6 cents. These figures include transportation costs to a common marketing area.

While Fig. 1 does not show it, the final cost to the consumer would be still higher. The motoring public now pays an average of about 15 cents per gallon above manufacturing costs. This 15 cents covers such additional costs as state and federal taxes, profit for dealers, tank-wagon distribution, and so on. Thus, retail prices for gasoline from coal and oil shale would be as much as 40 or 45 cents a gallon.

Recently the Bureau of Mines has made many statements with regard to synthetic fuels. These newspaper reports have included many cost items, ranging from the cost of shale mining to the cost of a 10-million-barrel-per-day synthetic industry. Most of this Bureau of Mines information does not indicate what cost items have been included and what ones have been left out. Nor do these reports indicate the basis for figures quoted.

For example, the Bureau of Mines recently stated that crude shale oil could be produced at a cost of $2.25 to $2.50 a barrel. The public would assume from this that crude shale oil would be competitive with petroleum. Such is not the case. The costs of manufacturing finished products from crude shale oil are materially higher than the costs of manufacturing finished products from crude petroleum.

Let us first consider the question of future requirements for liquid fuels and then take up the question of supplies that may be available to meet those demands. When this has been done, we will be in a better position to estimate when we will need for a synthetic industry.

A forecast of our future demands involves a long-range analysis. This can be done by considering certain significant trends in our economy.

DEMAND *and* SUPPLY

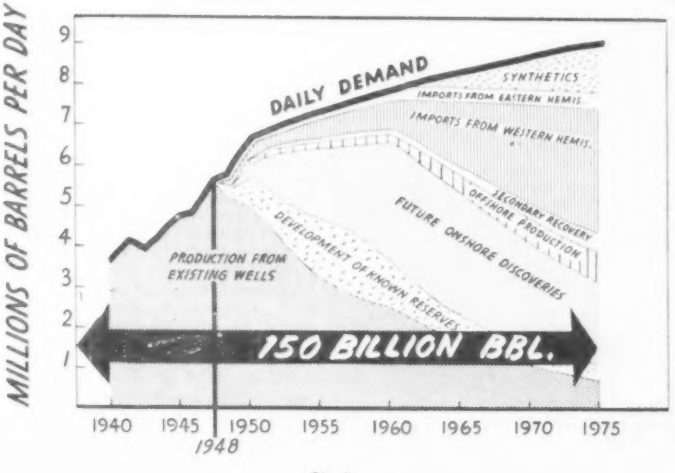


Fig. 5

DOMESTIC PRODUCTION *VS.* TOTAL DEMAND

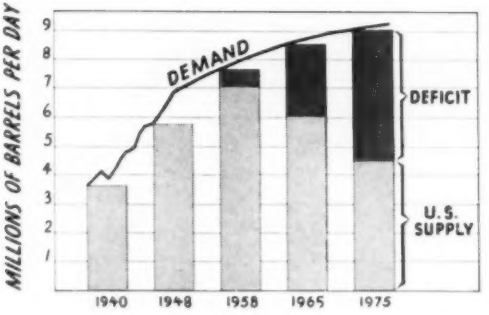


Fig. 6

These major trends include the growth of our population, the increasing use of automobiles, trucks, buses, and other motor vehicles, our rising standard of living and the decentralization of cities and industries.

From these trends we can estimate the increase in the number of motor vehicles between now and 1975. But such an estimate by itself is not enough to reveal probable gasoline consumption. Other factors must be included. While the average mileage per car will continue to increase, more efficient motors will tend to keep gasoline consumption per car from rising much above today's level. The combination of many such factors determines the demand for motor gasoline in the automotive field. In a like manner, consumption of gasoline in other uses such as aviation and farming may also be estimated.

The results of these calculations are illustrated in Fig. 2. Total gasoline demands during the next quarter century are estimated to reach 1,100,000 bbl. per day above present rates.

Using various forecasting methods, we can also estimate the consumption of other fuels and lubricants for airplanes, tractors, locomotives, miscellaneous light-duty power equipment, and heavy-duty machinery. Likewise, we can predict future needs for domestic and industrial heating fuels, greases, waxes, and other petroleum products.

When all these requirements are totaled, the demand curve shown in Fig. 3 results. By 1965 the nation will require 8,400,000 bbl. of petroleum per day. By 1975 that demand will reach 9,100,000 bbl. per day.

Various companies in the oil industry make forecasts extending far into the future. Only rarely is such a forecast published. The only other published forecast of total demand extended to 1975 which has come to our attention was made last May by the Bureau of Mines. The bureau estimates that demand for oil in 1975 will be from 12,700,000 to 16,400,000 bbl. per day—or 2 to 2½ times the present demand.

Fig. 4 compares our forecast of demand with those prepared by the Bureau of Mines. The bureau's figures appear far too high. We can hardly expect demand to keep going up at an increasing rate over such a long period. To reach such levels we must assume every use of petroleum will more than double, or that radically new uses will be found. Actually, the nation will reach the saturation point in many petroleum uses before that time. For instance, passenger cars will not double between now and 1975, even if the population reaches the largest estimate forecast by the Census Bureau.

If the nation's demand will rise to over 9,000,000 bbl. a day, as our forecasts show, how can these needs be supplied? These requirements can be filled in two ways: by crude petroleum, both domestic and foreign, and, when necessary, by synthetics from other raw materials.

For the immediate future at least, domestic petroleum will serve as the nation's major supply. This production will come from five sources—from existing wells, from the development of known but undrilled reserves, from future onshore discoveries, from future offshore discoveries, and from secondary recovery.

Production Declining

Production from the first of these domestic sources—existing wells—is declining at a regular rate. This type of decline has been characteristic of the average oil well for the past 25 years. On this basis, present active wells will produce another 28 billion barrels of oil by primary recovery. This estimate agrees quite well with that of the American Petroleum Institute, which predicted these reserves at 26.8 billion barrels as of January 1, 1949 (see Fig. 5). The rate at which these existing wells will be produced is shown in this figure. The top line is of course the total demand curve, while the lower, shaded portion of the illustration represents production from wells now in operation.

The next domestic source—known but undeveloped reserves—is expected to add another 10 billion barrels to the nation's ultimate recovery. These reserves will increase future supplies as indicated by the additional area in Fig. 5.

Next, future onshore discoveries can be estimated by correlating exploratory effort and cumulative oil discoveries. This correlation shows that in spite of technical progress, the industry's degree of success in wildcatting has declined through the years. New reserves discovered have been progressively smaller. Considering these factors, it is estimated that new onshore discoveries will increase our supply by 35 billion barrels. (Fig. 5.) The rate at which this oil will be produced after it is discovered is shown as the third addition to our supply curve.

Added together, the total remaining onshore reserves which we can recover by primary methods equals 73 billion barrels. The nation's production to date has been 37 billion barrels. Thus, our total ultimate primary recovery onshore is expected to be 110 billion barrels. Other methods of estimating these reserves yield results which do not vary substantially from this 110-billion-barrel figure.

Offshore Reserves

Now, let us consider offshore reserves. Production estimates from submerged coastal lands are difficult to make at this stage of development. By analyzing recoverable reserves on adjacent shore areas, however, it is possible to evaluate the oil-producing potential of offshore structures (Fig. 5). We expect that 20 billion barrels can be recovered from the Continental Shelf. The rate at which the industry can produce from offshore reserves will depend to a great extent on how soon the question of titles to offshore leases can be settled. The rate indicated here assumes that this issue will be settled in the next 2 years.

Finally, production in the United States should include the oil which can be obtained by secondary-recovery methods. Secondary recovery as used here is the oil recovered by supplying energy to the reservoir from external sources and represents production which could not be recovered unless external energy is supplied. Present-day secondary-recovery reserves have been estimated by the Interstate Oil Compact Commission to be approximately 8 billion barrels. In the future, secondary-recovery measures will be applied to fields not now included in this figure, and additional production will be secured. As time goes on, these techniques will be applied immediately in the development of new fields under sound engineering practice. We have chosen to call the extra oil produced by all such practices, secondary recovery (Fig. 5). Altogether, we estimate that secondary recovery should add 20 billion barrels to the nation's supply. This forecast is based only on methods in practice today.

From the five domestic sources, therefore, total ultimate crude production in the United States, onshore and offshore, is estimated to be 150 billion barrels. Of this total, 37 billion

(Continued on page 125)

VAN FIELD

Celebrates Its

20th Anniversary

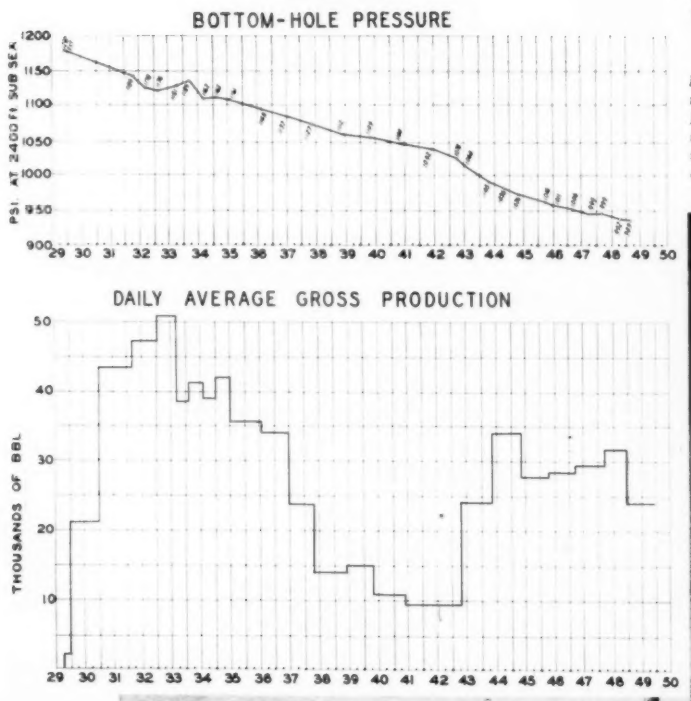
Field has produced over 200 million barrels with a pressure drop of only 241 psi.

by D. H. Stormont
District Editor

VAN field of eastern Texas, outstanding among Texas fields because of advanced proration practices which were first applied there and the fact that it is generally recognized as the first Texas field to be developed and operated under unit control, on October 14 began its twenty-first producing year. As it enters its third decade of production, at which age many like Woodbine sand fields have been in an advanced state of depletion, a status report on the field's current condition and how the reservoir is performing is in order.

When the discovery well at Van was completed by Pure Oil Co. on October 14, 1929, in the upper Woodbine at total depth of 2,710 ft., no flurry of uncontrolled drilling followed as was usually the case in those days. Instead, development was delayed until a unitization agreement, on an adjustment form of contract, was signed by the five leaseholders on the following November 1—just 18 days later. The agreement, setting up the Van Joint Account with Pure as the operator, covered what was then considered to include all probable productive acreage but did not include the unitization of royalty owners. Thus in the true sense of the term Van was not completely unitized.

Because the interests of royalty



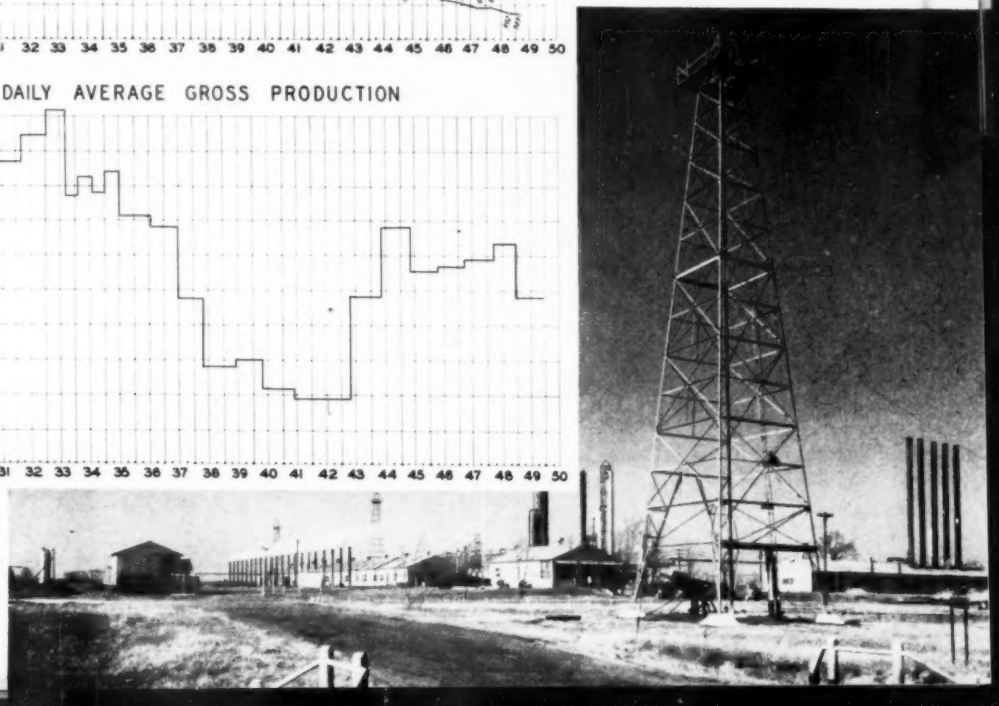
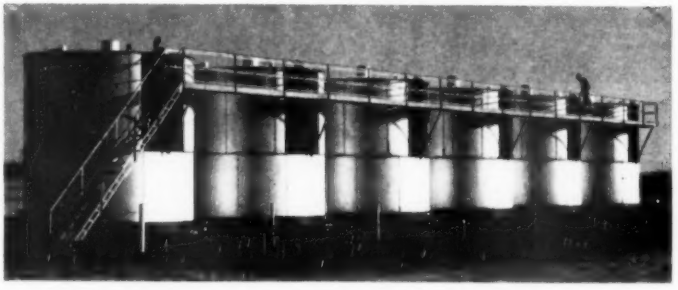


Fig 1—(Left) Charts of oil production and reservoir pressure for Van pool. Below: Van Joint Account gasoline plant. This installation includes 21 compressor units having a total gas handling capacity of 15,000,000 cu. ft. per day

ONE OF THE CENTRAL POWERS—This is a 30-ft. bandwheel power for pumping bentonitic (Lewisville) wells

owners were not unitized, the field was developed and has been operated in such a manner as to permit uniform withdrawals between individual tracts. Production throughout the field's life has been voluntarily prorated to assure the reservoir would not be injured through too rapid withdrawals; even when potential was included in the allocation formula wells were not subjected to open-flow tests. And, to assure that each lease and royalty owner received his fair share of oil, a method of allocating production among wells was evolved.

Allocation first was on a per well basis, then for a while a potential factor was included in the formula, but finally in 1935 allocation was changed entirely to a basis of acre-feet and bottom-hole pressure. Adjustments were made to keep the production of offsetting wells uniform and minimum allowables were established to assure a fair return for all wells. Thus Van field is generally credited as the birthplace for much of our modern thought in the allocation of production under proration, and as being the first field in which each lease and royalty owner was given his proportionate share of oil in relation to that contained in the whole reservoir.



A VAN TANK-BATTERY INSTALLATION.—Setup includes six 500-bbl. tanks and two separators

Just how determined the five operators were that the field would be assured an orderly development is best illustrated by the fact they paid $100,000 for a 0.7-acre lease in the townsite of Van. Such action hardly would be classified as commonplace even in today's modern oil operations, but this took place almost 20 years ago when the law of capture prevailed and oil proration did not have the backing of our courts that it now has. Had the lease not been brought into the unit, a townsite drilling program, such as took place in Kilgore, might have followed.

How Van Has Performed

How has Van field performed? Its accumulated oil production to date is slightly over 200,000,000 bbl. Average bottom-hole pressure of the Dexter horizon (lower producing member locally called the brown sand) is approximately 989 psi., or only 241 lb. less than the calculated 1,230-psi. original pressure. The field therefore has produced nearly a mil-

SALT-WATER-INJECTION STATION.—This is Pure's Butler plant, south of Van field. Concrete settling tanks and water-treating and filtration equipment are shown

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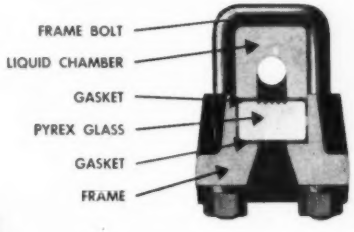

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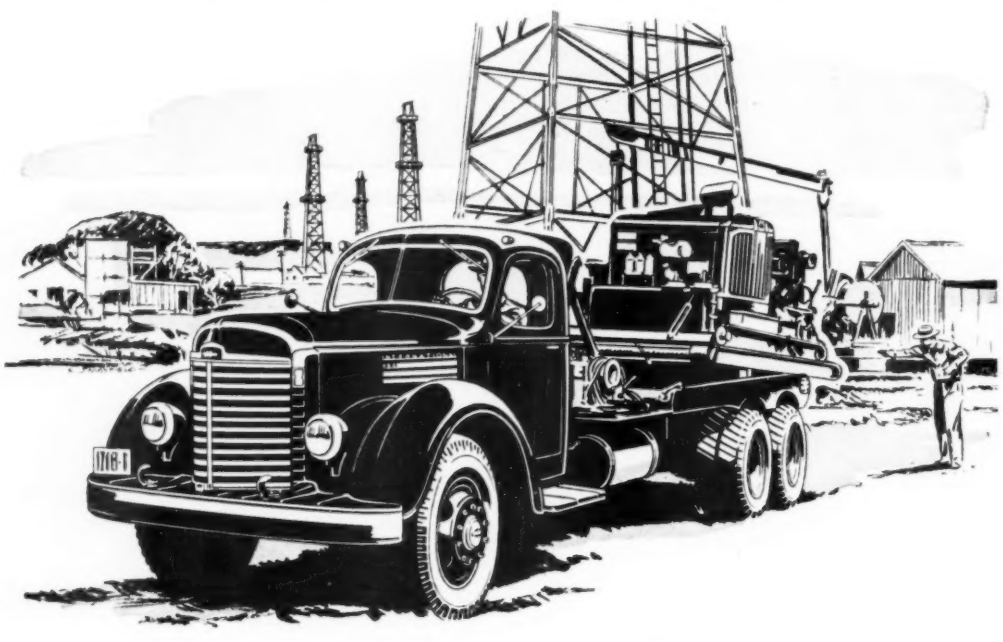

INTERNATIONAL TRUCKS

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lion barrels of oil per pound drop in bottom-hole pressure. Extending over 4,521 acres, it has been calculated that Van contains 1,168,689 acre-ft. of Woodbine sand (weighted average thickness 258.5 ft.) of which 55 per cent is oil bearing.

Of the original 577 Woodbine producers completed at Van, today 554 are still producing. Of the existing oil producers, 257 are still flowing their daily oil allowables with the remaining 297 being pumped. Practically all of the pumping wells are producing from the less-permeable, bentonitic Lewisville zone which overlies the Dexter sand, and are located on the flanks of the field. Pressure decline in this zone was relatively rapid so that majority of the pumpers have been so produced throughout most of their life.

Daily oil production throughout Van's life has been limited to less than 50,000 bbl. except for about 9 months during 1933 when it averaged 51,000 bbl. daily. (See Fig. 1.) Current MER set by the Railroad Commission is 35,000 bbl. daily. Its daily output during October, allowing for the 12 shutdown days scheduled, is some 21,200 bbl. on a calendar-day basis.

Because of the extremely effective water drive which has been taking place in the Dexter sand, no attempt at pressure maintenance through injection of water or gas has been undertaken. Some degree of pressure maintenance, of course, has been realized through the practice of limiting withdrawals. Also, beginning in November 1944, all produced brine has been returned to the Woodbine reservoir. This operation, however, is primarily one of water disposal rather than of maintaining pressures. These disposal facilities, as well as other current operations, will be discussed later in more detail.

Following the unitization of what was thought to include all probable productive acreage in 1929, Pure as operator proceeded to develop the Van Joint Account in a systematic and scientific manner. Drilling outside the 5,800-acre block, however, soon resulted in the proving of additional leases owned individually by Pure, Humble Oil & Refining Co., Texas Co., Shell Petroleum Corp., and others. These five companies, plus Sun Oil Co., constituted the Van Joint Account but efforts to extend the unit to include these properties were not thought advisable. Thus these properties, containing originally some 125 oil producers, have been operated by the individual companies—always, however, in close cooperation with the Van Joint Account.

Decision to include the 5,800 acres in the unit block was based upon geological and geophysical work supplemented by structural data obtained from eight core holes drilled in north-south and east-west lines across the structure. Initially the five participating companies share development expenses and participated in the unit's oil production in proportion to the acreage they had contributed to the unit. The agreement, however, provided that at the end of 2½ years the interests of the five participants would be reevaluated so that the adjusted interest of each party would be in the ratio of the ultimate productivity of the leases each had contributed to the ultimate productivity of all leases. Further, it provided that at the end of a 5-year period a final adjustment would be made.

TABLE 1—PERCENTAGE PARTICIPANTS IN THE VAN UNIT

	Original (11-1-29)	First adjustment (5-1-32)	Final adjustment (11-1-34)
Pure Oil Co.	81.70	77.06	76.73
Humble Oil & Refining Co.	7.75	0.66	0.55
Texas Co.	4.51	8.54	8.36
Sun Oil Co.	3.57	5.58	5.18
Shell Petroleum Corp.	2.47	8.16	9.18

The percentage participation of the five companies in the unit originally, after 2½ years, and after the final 5-year adjustment was made are given in Table 1. The adjustments were retroactive to November 1, 1929. Thus none of the companies lost through unitizing before the field was developed, and all profited from the scientific handling of the field, lower operating costs and other beneficial results of unitization.

Briefly, Van field is a faulted uplift, elongated in a northeast-southwest direction. Production is associated with structural closure against a major dip to the southeast fault whose strike is northeast-southwest, and also a relatively minor fault northwest of the main fault, but with the same strike and direction of the throw as the main fault. Numerous adjustment faults radiate from the main fault in an easterly and southerly direction. Despite this highly faulted condition only 25 dry holes were drilled in defining the productive limits of the unit area.

The oil-bearing portion of the Woodbine on top of the Van dome has a maximum thickness of about 680 ft., thinning down to zero at the minus 2,500-ft. datum plane which is considered to be the uniform water table for the entire field. The Woodbine is separated into two divisions, the upper or bentonitic section (Lewisville) and the lower or brown sand section (Dexter). The latter occurs at minus 2,290 ft. subsea, is by far the most permeable and saturated, and represents the much greater reserve.

As stated earlier, Van is one of the few important old fields which has been under proration throughout its life. First proration was voluntarily imposed by the unit operator on a per well basis. On August 14, 1930, the productive area was divided into 20-acre units and the basis of allocation changed to acreage and potential (based on 3-hour flow through ¼-in choke) with a minimum of 100 bbl allowed per well.

On October 19, 1931, production engineers of Pure Oil Co. succeeded in having a new plan adopted which provided that daily production be limited to 50,000 bbl., and that the allowable be distributed solely on an acre-foot basis. A minimum allowable of 25 bbl. per well was provided, however.

To obtain accurately the number of acre-feet of Woodbine sand under individual leases, the top of the Woodbine, including fault faces, was contoured on 20-ft. intervals to minus 2,500 ft. or to the field's water level. Planimeter calculations of individual leases gave the volume of Woodbine present under each lease above water level. The top of the underlying Comanchean, where it was found above minus 2,500 ft., was also contoured on 20-ft. intervals and its volume under each lease determined. Thus by deducting the Comanchean volume from the Woodbine, on leases where the former reached above the Woodbine water level of the field, the actual number of acre-feet of Woodbine was calculated.

Of the 450 wells which had been drilled at the time of the valuation, 159 had cored continuously through the Woodbine. Analyses of these well records showed a remarkable uniformity of 50 per cent sand and 50 per cent shale throughout the field. Because of this good control the acre-foot determinations were believed to be relatively accurate.

On March 1, 1935, after the accuracy of bottom-hole-pressure instruments became recognized, it was decided that a pressure factor should be included in the allocation formula in order to further insure equitable withdrawals. Accordingly the allocation method was changed to a basis of 50 per cent to acre-feet and 50 per cent to bottom-hole pressure at the minus 2,400-ft. datum. To care for weak wells, however, a minimum allowable of 20 bbl. also was provided. This formula remained in effect until May 1, 1945, when it was modified by using acre-feet times bottom-hole pressure as the factor rather than giving 50 per cent to each and adding them to arrive at the total per-well allowable.

More than 300 key wells are used in making the quarterly bottom-hole-pressure surveys. This large number is required because of the several ad-

(Continued on page 129)

The Roughness Problem

With respect to flow through commercial steel pipe and the direct solution of the Fanning equation for either the flow rate or diameter

by Oscar Wolfe

A MUCH more complicated state of affairs arises when the pipe walls are rough. We have already referred to the fact that the thickness δ of the laminar film becomes less as the state of agitation of the fluid in the pipe increases. Then, if in a rough pipe this greater turbulence is caused by an increase in the flow rate, the point eventually will be reached where the protuberances of the pipe wall begin to emerge beyond the limit of the laminar film.

At this point, the flow regime becomes a function of two independent agencies, namely, the internal factor N_R and an outward feature caused by the pipe-wall roughness e/D. During the initial phase, the effect of $DV\rho/\mu$ outweighs the roughness factor. However, as the laminar film becomes thinner and thinner as the result of increased turbulence, the effect of wall roughness finally surpasses the internal factor. In this extreme range, the friction coefficient then becomes constant and the flow regime is spoken of as being "wholly rough."

At this point, it is well once more to refer to the conclusions drawn from the Fritsch* experiments at Aachen. These tests confirm that any changes in the velocity curve brought about by an increase in wall roughness, while the pressure gradient or resistance to flow remains constant, take place at the expense of the wall velocity v_w and do not affect the shape of the central or turbulent portion.

Experimental search into the phenomena of resistance to flow in rough pipes cannot hope to produce consistent results unless the types of roughness in one pipe as against another are geometrically similar and capable of being characterized by a single parameter as, for instance, e/D. This condition is fulfilled by the artificially roughened pipe used in Nikuradze's tests at Gottingen and the following equations are based upon these test results.

Now, applying Equation 28 to the

*Fritsch, "Abhandlungen aus dem Aerodynamischen Institut der Technischen Hochschule. Heft 8.

This is Part 3 of a three-part article which began in the issue of October 6. Part 2 was published in last week's issue.

borderline between the laminar film and the turbulent section of the velocity curve, namely:

$$v_w/v^* = v_m/v^* - 5.75 \log_{10} (r_o/y_w) \quad (28)$$

But, unlike the v_w/v^* ratio for smooth pipes which is a constant equal to $\delta N^*/D = 11.6$, this ratio is variable when applied to rough pipes and changes with the degree of roughness. Just how it changes can only be found from experiment and by the choice of suitable parameters which will plot all degrees of roughness into one single curve.

Thus, if we write for $y_w = me$ in which e represents the absolute roughness height and m a form factor depending upon the size and shape of the wall roughness, the velocity deficiency equation becomes:

$$v_m/v^* = v_w/v^* + 5.75 \log_{10} (r_o/me)$$

or

$$v/v^* = \underbrace{v_w/v^* - 5.75 \log_{10} m}_{A_R} + 5.75 \log_{10} (y/e)$$

hence

$$v/v^* = A_R + 5.75 \log_{10} (y/e) \therefore \quad (34)$$

$$v_m/v^* = A_R + 5.75 \log_{10} (r_o/e) \quad (35)$$

But, we also have found by Equation 31 that:

$$v_m/v^* = 3.75 + V/v^*$$

and (35) therefore becomes:

$$V/v^* = A_R - 3.75 + 5.75 \log_{10} (r_o/e)$$

$$V/v^* = N_R/N^* = \alpha = (8/\lambda)^{1/2} \quad (7)$$

$$A_R = \alpha + 3.75 - 5.75 \log_{10} (r_o/e) \quad (36)$$

When Nikuradze plotted his test results for A_R against $e N^*/D$ as the abscissa, he found that A_R for all degrees of roughness fell on to one single line as shown by Fig. 14.

The locus of the curve

$$A_R = f (e N^*/D)$$

thus shows that for values of

$$\log_{10} (e N^*/D) > 1.83, A_R = 8.48$$

is constant. The flow regime at that point has become "wholly rough" and conforms to the quadratic resistance law. Introducing this value in Equation 36, we get:

$$\alpha = 4.73 + 5.75 \log_{10} (r_o/e)$$

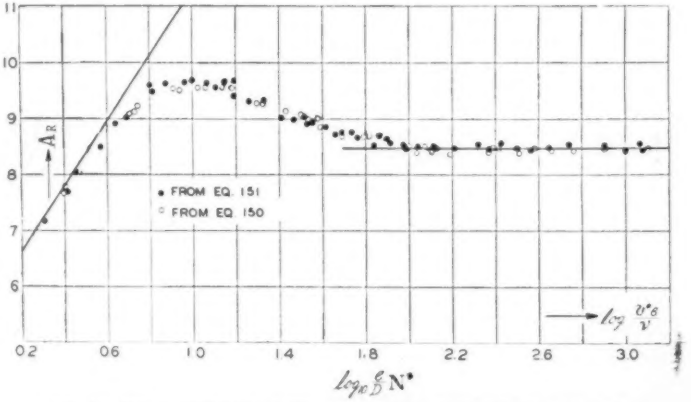


Fig. 14—The A_R coefficient. (After Nikuradze, in Forschungsheft V.D.I. 361)

However, better correlation with the Gottingen results is obtained if this expression is written with slightly different constants, i.e.:

$$a = 4.92 + 5.656 \log_{10} (r_o/e)$$

Generalized Roughness Function

(a) Based on artificially roughened pipe.—Then by plotting the Nikuradze test results according to Equation 36 as a function of $\log_{10}$ (e N*/D), i.e.,

$$a + 3.75 - A_R - 5.75 \log_{10} (r_o/e)$$

$$= f (\log_{10} e N^*/D) \quad (37)$$

Prandtl succeeded in establishing the so-called generalized roughness function for all degrees of roughness as represented by the Nikuradze sand grain pattern. This functional relationship is shown in Fig. 15.

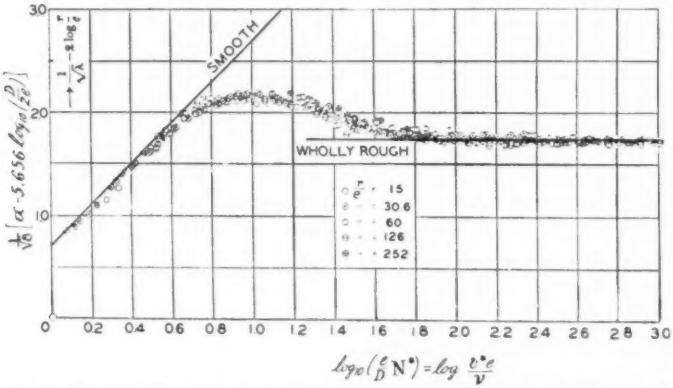


Fig. 15—The generalized roughness function, Prandtl. (After Nikuradze, in Forschungsheft V.D.I. 361)

The only portion of this curve of interest to use is that for

$$\log_{10} (e N^*/D) > 1.83,$$

where the flow is wholly rough, namely:

$$a = 5.656 \log_{10} \left(\frac{3.77}{e/D} \right) \quad (38)$$

(b) Based on commercial steel pipe. It was quickly recognized, however, that the generalized roughness function as shown under (a) above is quite at variance with results obtained from commercial steel pipe. There appears to be an essential difference between the statistical roughness pattern of the Nikuradze sand grain profile and the surfaces forming the interior walls for commercial steel pipe.

When the flow results from commercial oil and gas pipe lines are plotted into the diagram of Fig. 15, they will fall into a smooth transition curve between the "smooth" and the "wholly rough" lines.

This was demonstrated by Colebrook* when he plotted the roughness function for several types of commercial pipe as:

Galvanized iron pipes	e = 0.006 in.
Asphalted cast iron pipes	e = 0.005 in.
Uncoated cast iron pipes	e = 0.010 in.
Wrought iron pipes	e = 0.0017 in.

Even wider scope was given to the Colebrook analysis by inclusion of test data on the 216-in. Ontario concrete tunnel for Reynolds numbers ranging from 5,000,000 to nearly 28,000,000. He thus found that the transition curve for all of these classes of pipe plotted into one single line with no more scatter than might be expected from observational inaccuracies. The approach of this line to the "smooth" and the "wholly rough" lines is asymptotic. Colebrook plotted this function in the form:

$$\log_{10} [3.7 D/e - 1/(\lambda)^{1/2}]$$

vs. $\log_{10}$ (e N*/D)

as shown in Fig. 16.

Experimental confirmation of the Colebrook transition curve also has been reported by Rouse.† For his analysis, Rouse made use of flow test data on wrought iron, cast iron, and galvanized pipes and obtained a transition curve which, in his judgment, may be regarded "as a close approximation to the actual resistance law."

To express the transition curve in analytical form, Colebrook suggested the following expression:

$$\frac{1}{(\lambda)^{1/2}} = -2 \log_{10} \left(\frac{e}{3.7 D} + \frac{2.51}{N_R (\lambda)^{1/2}} \right)$$

However, it will be noted at once that this form of the Colebrook equation contains λ on both sides. Direct solution for λ is, therefore, impossible and trial and error must be resorted to. This difficulty can be avoided, however, by transforming the above equation into the following form:

$$a = 5.656 \log_{10} \left(\frac{3.77}{\frac{e}{D} + \frac{3.278}{N^*}} \right) \quad (39)$$

In commenting on the degree of accuracy of λ which may be expected from the use of the Colebrook function, Prof. F. L. Moody‡ makes the following observation " . . . it must be recognized that any high degree of accuracy in determining λ is not to be expected. With smooth tubing, it is true, good degrees of accuracy are

(Continued on page 121)

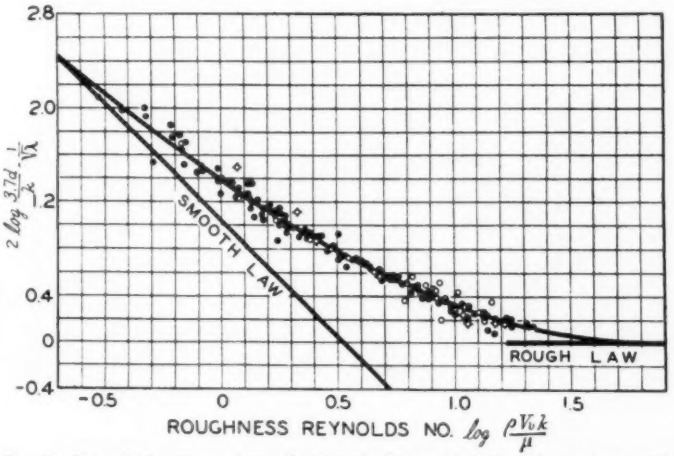


Fig. 16—Theoretical and experimentally determined "transition" laws for various rough surfaces, after Colebrook

*Dr. C. F. Colebrook, "Turbulent Flow in Pipes, with Particular Reference to the Transition Region Between the Smooth and Rough Pipe Laws," Inst. of Civil Engineers No. 5204.

†Hunter Rouse "Evaluation of Boundary Roughness," State University of Iowa.

‡Prof. F. L. Moody, "Friction Factors for Pipe Flow," Trans. A.S.M.E., Vol. 66, 1944.

BILLINGS REFINERY

Ready for Preliminary Tests

This new 9.5-million-dollar plant designed to process 7,500 bbl. per stream day

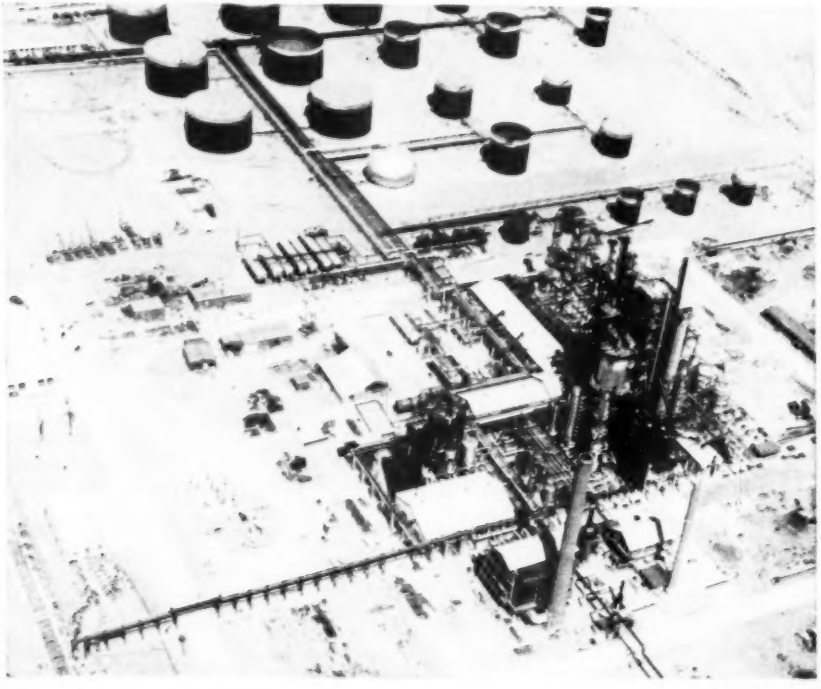
THIS article describes the new $9,500,000 refinery of Continental Oil Co. at Billings, Mont.—now ready to go on stream. Today, Continental has refineries at Ponca City, Okla.; Denver; Lake Charles, La.; Wichita Falls, Tex.; Glenrock, Wyo.; and Farmington and Artesia, N. M.; besides the company's latest plant at Billings. In partnership with Cities Service Co., Continental also is erecting a $35,000,000 plant at Lake Charles for the manufacture of lubricating oils and waxes.

The Billings plant is of the most modern design and contains a crude-fractionation unit, propane deasphalting, catalytic cracking, catalytic desulfurization, catalytic polymerization, and L.P.G. facilities. Copper sweetening will be used for the straightrun gasoline and doctor sweetening for the heating oils. All the units are designed for balanced operations with no intermediate tankage. Interconnecting instrumentation coordinates the operations as the streams pass the various units.

Crude Unit Processes 7,555 Bbl.

The crude unit is designed to process 7,555 bbl. per stream day of a mixture of Elk Basin and light Frannie crudes having a blended gravity of approximately 28.1° A.P.I. and a sulfur content of 2.2 weight per cent. The crude is charged to the unit through bottoms-feed and circulating reflux-crude exchanger system, where the temperature of the crude is raised to 470° F., and is then heated to approximately 750° F. in a conventional tube-still heater. It then passes into

CONTINENTAL MEN.—Supt. J. A. Ramsey, of the Billings refinery, and J. E. Fenex, western region manufacturing superintendent, Denver



NEW $9,500,000 REFINERY.—Continental's eighth refinery is located on a tract of 118 acres in the southeast section of Billings, Mont. On the tract is a tank farm with storage capacity for 35,800,000 gal. of crude and refined oils. Daily crude-oil charging capacity is 7,500 bbl. A flow chart explaining the processing used appeared in the Journal's annual refining number of March 24, 1949, page 181

Baash-Ross News

BAASH-ROSS TOOL COMPANY • LOS ANGELES • HOUSTON • OKLAHOMA CITY • NEW YORK

OUR 29th YEAR

Here's the kind of RUGGED CONSTRUCTION you need for SUSTAINED OPERATION on today's drilling operations!

The BAASH-ROSS DRILLING TYPE BUMPER SUB

THERE'S A LOT OF DIFFERENCE IN BUMPER SUBS—particularly in the internal construction and provision for long sustained operation under the most rugged of modern high speed drilling operations. As its name implies, the Baash-Ross *Drilling Type* Bumper Sub is specially engineered for rough and tough drilling applications . . . specially engineered to *stay on the job* for run after run with minimum maintenance and attention.

Moreover, its simple design and construction eliminates complicated mechanisms and assures quick, direct operation whenever its protection is needed. It can be used to strike both *DOWN* and *UP* blows with equal effectiveness!

AMPLE RADIAL DRIVE

Here's a vertical cross-section view of the Baash-Ross Drilling Type Bumper Sub. Note the ample number of drive keys equally spaced around the circumference of the tool . . . plenty of keys to transmit all the torque the drill string can handle—and to withstand heavy vibration and rough drilling.

. . . PLUS LARGE VERTICAL SURFACE

Coupled with the ample number of radial drive keys is the extra long vertical length of each drive key, as shown in the accompanying illustration. Not only are there plenty of drive keys spaced radially around the tool, but each key is unusually long so as to provide more than enough contact area for all types of drilling loads. Because torque loads are distributed over a greater surface, wear and abrasion are minimized and maintenance is reduced to a minimum.

Replaceable Bronze Inserts LENGTHEN LIFE

In addition to the unusually large drive surface provided by the ample number of radial drive keys and their long vertical length, here's another important Baash-Ross feature . . . each drive key is so designed that the drive surface can be completely renewed by simply replacing removable bronze inserts—a quick and easy operation.

These bronze inserts not only provide the longer life of bronze against steel contact, but being softer than steel they take whatever wear does occur. Thus, by simply replacing the bronze inserts at periodic intervals, the Drilling Type Bumper Sub is easily maintained at peak operating efficiency throughout many thousands of feet of heavy-duty drilling service.

Easy to Use—And Many Uses!

- **The Baash-Ross Bumper Sub will strike either a down or up blow to loosen stuck pipe, reamers or bit. Down blows are struck by dropping the drill string straight down, while up blows are struck by "springing" the drill string when the Sub is partly open, thus striking a sharp blow on the up stroke. Both types of blows are easy to strike and their intensity can be readily controlled as desired.**
- **The Drilling Type Bumper Sub can be placed wherever desired in the string—above bit, reamer or drill collars. Many operators also use it to provide a "free joint" in the drill string between tension and compression zones, thus assuring more accurate weight control.**
- **In addition, this Bumper Sub can also be used in any type of fishing operation, further increasing its all-around utility!**

PACKED OFF FOR HIGH PRESSURE CIRCULATION

Still another important Baash-Ross feature is the high-pressure packing unit between mandrel and sleeve that permits very high circulation pressures to be maintained through the Bumper Sub without leakage. Whenever necessary, the packing can be easily inspected, tested and replaced right on the rig.

Also, note the large circulation passage through the tool that not only permits full volume circulation to the bit, but also permits running wire line tools through the Bumper Sub without risk of hanging up.

From every angle, this tool is designed and built to meet the vital requirements of *sustained operation* in modern drill strings!

AVAILABLE IN ALL POPULAR SIZES

The Baash-Ross Drilling Type Bumper Sub is available in a complete range of sizes to fit Regular, Full Hole and Internal Flush drill strings from 3½" through 6¾"—for both Left and Right Hand strings. Standard stroke is 16", but other strokes can be supplied on order.

Write direct for full details*—or see your nearest *Baash-Ross representative!

(Leased in U.S.A.—Sold for Export only)

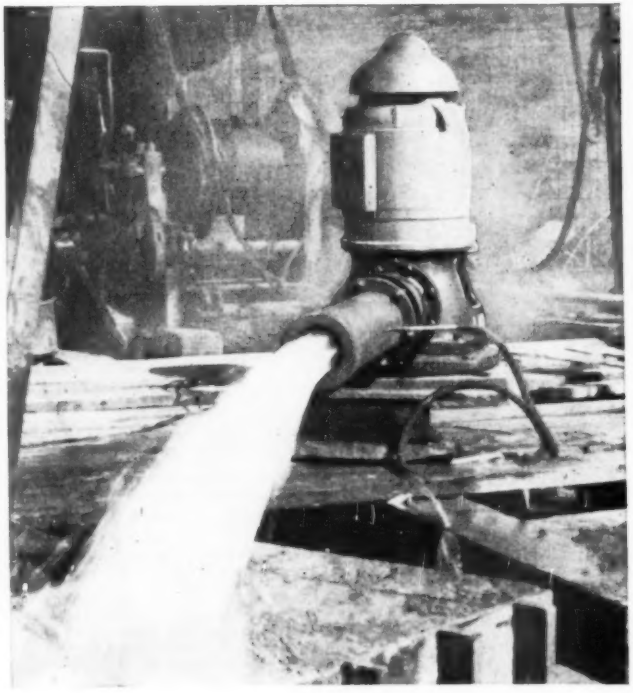
WHAT'S TO BE GAINED BY MAKING COMPARISONS

THERE IS NO BETTER YARDSTICK

COMPARISON is a fair yardstick in buying any well water system. That is why Layne welcomes and urges comparison with any and all other systems now being built. Comparisons quickly reveal the superiority of Layne designing as reflected by higher overall efficiency, better materials and low upkeep cost, plus extra rugged construction insuring longer life.

In addition there is the all important matter of proper installation. Leading engineers of the country readily admit that Layne installation methods are better. They provide well water systems with increased capacity and keep operation cost surprisingly low.

The choice of a Layne Well Water System is a wise and profitable selection. Thousands of big, medium and small installations are giving economical and satisfactory service today and will continue to do so for many years.



Vertical Turbine PUMPS

—are available in sizes from 40 to 16,000 gallons per minute and may be used in already constructed wells, for irrigation, pressure boosting, fire control or transfer services. Write for pump catalog.

BUILT TO ADEQUATELY FULFILL YOUR WATER SUPPLY NEEDS

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the crude-fractionating tower. This tower is 7 ft. in diameter and contains 16 trays.

The crude is fractionated into three streams consisting of:

Stream—	Per cent on crude	Gravity °A.P.I.
600° F. e.p. overhead	47	
Gas oil	15	24.8
Reduced crude	38	12.5

The overhead vapors contain the straightrun gasoline and heating oils which are subsequently catalytically desulfurized in the treating reactor. The gas oil provides part of the charge to the fluid catalytic cracking unit, and the reduced crude is the charge to the propane deasphalting unit.

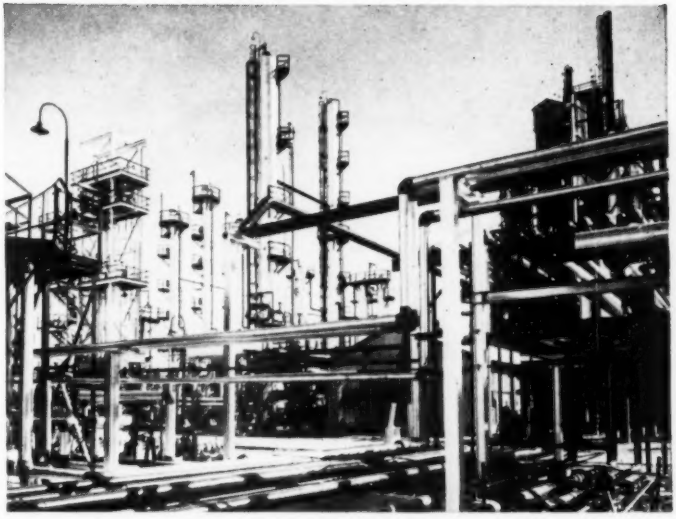
Propane Deasphalting

This unit is used to prepare a clean heavy gas oil for charge to the fluid catalytic cracking unit, with the residual asphalt stream blended to fuel oil with cycle gas oil. It is designed to process 2,870 bbl. per stream day of reduced crude and produce a net overhead product of 1,985 bbl. of 21° A.P.I. gravity gas oil, and a bottoms asphalt product of 885 bbl. of a minus 3.4° A.P.I. gravity. The unit consists primarily of a surge drum for the propane solvent, charging equipment for the reduced crude and propane, a countercurrent tower where the actual asphalt separation is effected, and equipment for recovering the propane solvent.

The reduced crude feed comes directly from the crude-fractionating tower, passing through a cooler to reduce its temperature to 160° F. Three reduced crude feed entrance nozzles are provided in the upper half of the extract tower, although only one will normally be used.

The extraction tower is 9 ft. 7½ in. in diameter and contains 16 perforated plates for assuring intimate contact between reduced crude and the propane solvent. Ten steam heating coils are located in the upper two-thirds of the tower. Steam to these coils is regulated by a temperature-recording controller to maintain a constant top-tower temperature.

The solubility of the gas oil in the propane varies with the temperature; so the quality of the gas oil product is regulated by this temperature control. The propane solvent circulation will be 17,000 bbl. per day, which is a 6:1 ratio on the reduced crude feed. This propane is injected into the extraction tower in the bottom section, and it flows upward countercurrently to the asphalt which collects in the base of the tower. A pressure of 500 psi. is maintained on the extraction tower by a pressure controller on the overhead gas oil - propane stream.



***GAS RECOVERY, PURIFICATION, AND CATALYTIC POLYMERIZATION EQUIPMENT.**— Here light hydrocarbons are separated from residual fuel gas and hydrogen sulfide, catalytically polymerized and fractionated to produce a high octane gasoline blending stock and liquefied petroleum gases*

***CONSTRUCTION.**—Billings refinery has been under construction for nearly 2 years; from 300 to 800 workers were employed during the building period*

The propane is recovered from the gas oil in the three stages, namely, the first-stage evaporator, second-stage flash, and deasphalted oil stripper operating at 305, 205, and 2 psig., respectively.

The asphalt stream from the base of the extraction tower consists of approximately equal quantities of asphalt and propane. This mixed stream is heated to 600° F. in a vertical upshot heater and from there passes to a flash drum operating at 205 psi. where most of the propane is removed. The remainder is taken out in the asphalt stripping column operating at 2 psig. A compressor is provided for recovering the propane removed in the two stripping columns operated at 2 lb., delivering the propane to the solvent condensers, thereby effecting efficient propane recovery.

Catalytic Cracking Processes 3,770 Bbl.

The catalytic cracking unit is of the fluid type designed to process 3,770 bbl. per day of 23° to 25.5° A.P.I. gravity virgin gas oil. It will operate at 79 per cent conversion while recycling approximately 5,000 bbl. per day of cycle stock. Silica-alumina microspherical type catalyst will be used.

The virgin feed to the reactor is as follows:

	B/SD
Deasphalted gas oil	1,985
Atmospheric gas oil	1,130
Heavy distillates	665
Total	3,770

The yields expected from the cracking unit are:

Debutanized 400° F. e.p. gasoline, L.V. %	56
Cycle gas oil, L.V. %	21
Butane-butylenes, L.V. %	15
Propane-propylene, L.V. %	11
Ethane and lighter, wt. %	4
Coke, wt. %	11

The reactor is 15 ft. in diameter and contains an internal stripper for the spent catalyst leaving the vessel. Single-stage cyclones are installed in the top of the reactor to reduce the amount of catalyst leaving with the vapors. Catalyst will be circulated to the reactor at the rate of 525 tons per hour. The reactor is installed high in the structure so that the spent catalyst flows downward from the stripper through a slide valve into the side of the regenerator.

Following the reactor is the main fractionating column where gasoline and lighter are taken overhead while heavy naphtha and light cycle gas oil are produced from side-stream strippers. Cycle stock from the main fractionator is circulated for reboiler oil duty in the gas-concentration unit and for steam generation. The gasoline and gas pass to the gas-concentration unit, and cycle gas oil is withdrawn for fuel-oil blending.

The regenerator is 23 ft. in diameter and 50 ft. high and is large enough to reactivate the catalyst used in both the cracking reactor and the catalytic desulfurization or treating reactor. Two-stage cyclone separators are installed in the regenerator to minimize the loss of catalyst with the flue gases. A waste-heat boiler is provided to recover heat from the flue gas, generating 175-lb. steam.

Air for burning the coke from the catalyst is supplied by a centrifugal compressor driven by a 2,600-hp. steam turbine. The design capacity of this unit is 25,000 cu. ft. per minute from 13 to 39 psia.

Catalytic Desulfurization

A second reactor, 8 ft. 6 in. in diameter, is installed in conjunction with the catalytic cracking unit. About 26 tons per hour of catalyst are fed to this reactor with the overhead vapors from the crude-fractionation tower. Reactor temperature will be maintained at 700° F., which will substantially reduce the sulfur content of the straightrun gasoline and heating oils. The oil vapors pass from the treating reactor to the rerun fractionating system. The spent catalyst passes from the treating reactor through a stripper, standpipe, and slide valve into the regenerator which serves both the treating and cracking reactors. This method of installing the treating reactor with the cracking unit provides a continuous desulfurization system with a minimum of equipment.

Rerun Unit and Girbotol Treating Plant

Vapors from the desulfurization reactor pass to a rerun tower at a temperature of 700° F. Six separate streams will be produced from this 32-tray column. Approximate distillation ranges are as follows:

1. Overhead: 250° F. end point straightrun gasoline.
2. First side cut: 250°-350° F.
3. Second side cut: 350°-400° F.
4. Third side cut: 400°-510° F.
5. Fourth side cut: 510°-600° F.
6. Bottoms: 600° F. plus.

After debutanization of the overhead stream, the following quantities will be blended as below:

Stream	(B./CD.)	Tractor dist. (B./CD.)	No. 1 dist. (B./CD.)	Diesel (B./CD.)	Straight-run gasoline (B./CD.)	To catalytic cracking (B./CD.)
1	600				600	
2	798	90			708	
3	447	90	290	20	47	
4	622	80	145	155		242
5	416			175		241
6	134					134
Total	3,017	260	435	350	1,355	617

The 617 bbl. per calendar day will supplement the side-cut gas oil from the crude-fractionation unit and deasphalted reduced crude as feed to the catalytic cracker. All butanes and lighter from the rerun section will enter the Girbotol treater along with light catalytically cracked gasoline and cracker wet-gas production. A small motor-driven compressor will handle the fixed gas production from the reflux drum of the rerun column, discharging this stream to the Girbotol unit. The straightrun stabilizer will be refluxed with feed to the tower, the overhead vapors at 65 psig. pressure venting to the discharge of the first-stage compressor in the Girbotol unit. Two packed contact towers, one for treating liquid hydrocarbons and the other for vapors, will be used for removal of H_2S from these streams.

The second-stage compressor takes suction through a scrubber drum on sweetened gas and discharges through recontacting coolers (along with sweetened liquids) through a water separator drum and into an absorber-stripper column operating at 225 lb. The deethanization accomplished in this tower prevents the necessity of recycling uncondensed vapors from the reflux drum of the subsequent debutanization step. From the 36-tray debutanizer, propane-butane overhead will be potential catalytic polymerization feed and 1,915 bbl. per calendar day of debutanized catalytically cracked gasoline will be produced from the base of this tower.

Catalytic Polymerization Unit

The polymerization unit will be charged with 1,175 bbl. per stream day of mixed propane-butane feed containing approximately 50 mol. per cent of unsaturates. To insure a sweet charge to the unit, the mixed feed is given a caustic wash. This is followed by a water wash, a water settling drum, and a surge drum. The charge pump will deliver fresh feed and "spent" butane (as recycle) to the reactors at a pressure of 1,000 psi. Feed will first be heated by exchange with total effluent and then by steam generated in the process before passing through the two reactors in series.

The reactors are constructed of tube-and-shell design. Each reactor will contain one hundred twenty-one 2-in. tubes 30 ft. long. Catalyst will be placed in the tubes, and water will be circulated for cooling on the shell side. Each reactor will contain 4,300 lb. of U.O.P. catalyst and will operate at a space velocity of 0.24 gal. per hour per pound.

Effluent from the reactors, after heat exchange, will be fractionated in a deethanizer, depropanizer, and debutanizer operating at 350, 185, and 60 lb., respectively. Propane will be sold as L.P.G., and butane will be sold directly and/or blended into finished gasoline. Approximately 400 bbl. per stream day of true polymer will be produced for gasoline blending. Design conversion for the unit is 85 per cent.

Construction of the refinery was by Jones & Laughlin Supply Co. as the major contractor, with Conoco and Universal Oil Products Co. also participating in the design. Chicago Bridge & Iron Co. built the tanks.

New Edition of Manual

A new edition of Section I of the A.P.I. Manual of Disposal of Refinery Wastes is off the press and available for purchase. This is the fourth edition of this publication and supersedes the edition published in 1941 by the American Petroleum Institute.

The new edition incorporates the latest thinking on the design of waste separators, and sets forth information on filtration of wastes, treatment of emulsions, sampling and testing, measuring waste water flow, and handling ballast water pumped from ships into refinery disposal facilities. The edition is priced at $2 per copy, and may be purchased through J. A. McNally, American Petroleum Institute, 50 West 50th Street, New York.

(Aerial view of Carteret, N.J.)

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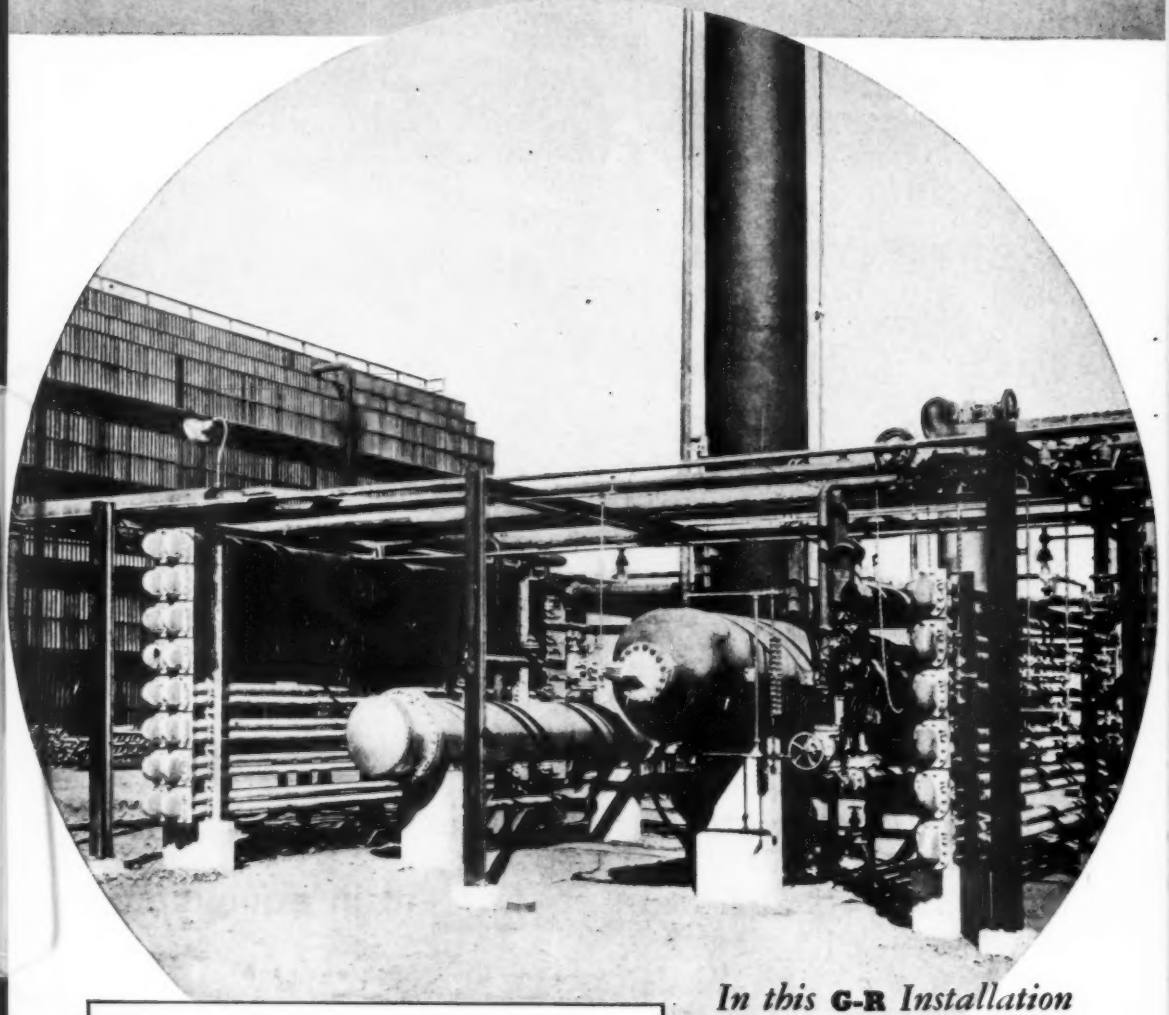

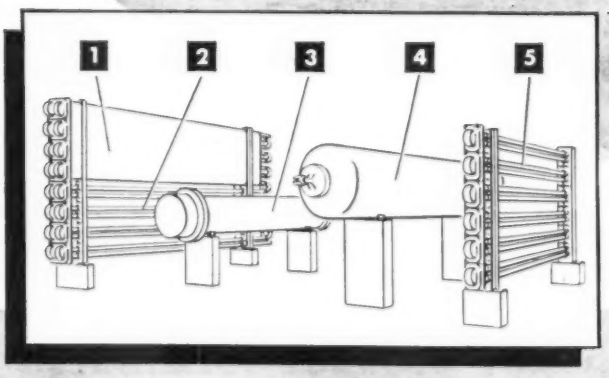

In this G-R *Installation*

1. 8 G-R Twin G-Fin Sections, serving as Stabilizer Exchanger
2. 8 G-R Twin G-Fin Sections, serving as Stabilizer Cooler
3. G-R Type FLT Tubular Stabilizer Condenser
4. G-R Type FSE Stabilizer Reboiler
5. 6 G-R Twin G-Fin Sections, serving as Naphtha Side-Cut Cooler

GRISCOM-RUSSELL · PIONEERS IN HEAT TRANSFER APPARATUS

G-R

HEAT TRANSFER APPARATUS Fully Serves a Stabilizer In This Installation

As shown in the illustration on the adjoining page, all the heat transfer apparatus required for the stabilizer at this representative refinery is of G-R design. The G-R units include cooler, exchanger, reboiler and condenser, and also naphtha side-cut cooler.

Many additional G-R units, not shown in the illustration, were also installed for other services here; for this refinery, like hundreds all over the country, standardized on G-R Heat Transfer Apparatus to assure most effective heat exchange and recovery throughout the plant.

Whatever may be *your* heat transfer requirements . . . whether standard or special . . . investigate G-R designs. The unequalled range of G-R apparatus, including both finned tube and bare tube heat transfer surfaces, provides an exactly suitable design for every service. Write for descriptive bulletins on units for services in which you are interested.

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TYPICAL DESIGNS OF G-R HEAT TRANSFER APPARATUS

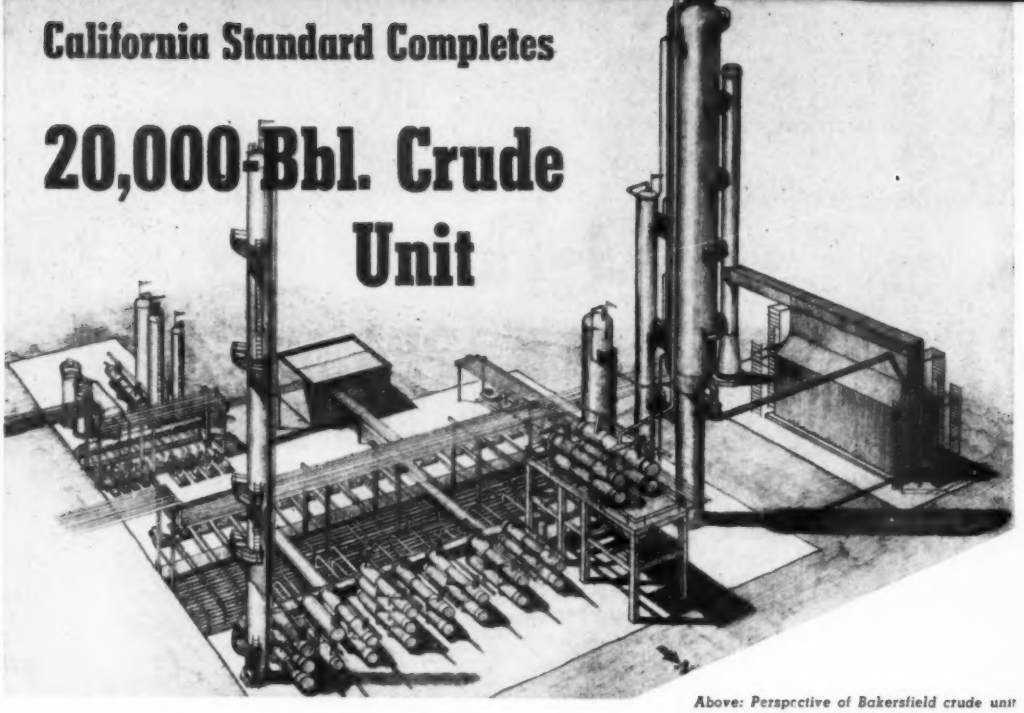
G-R Tubular Exchanger, available with many different designs of stationary and floating heads, and with exclusive service features

Sectional drawing of the G-R Twin G-Fin Section, the heat exchanger with a greater range of applications than any other design on the market

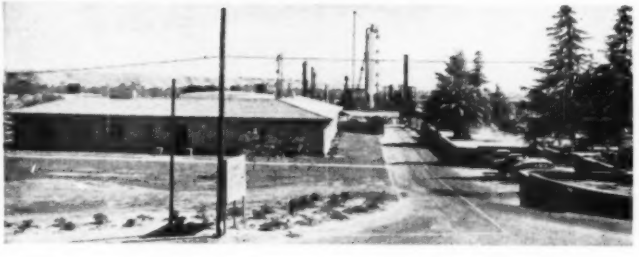
One of the designs of G-R Reboiler, available with bare tubes or K-Fin elements.

GRISCOM-RUSSELL

California Standard Completes 20,000-Bbl. Crude Unit



Above: Perspective of Bakersfield crude unit showing (right to left) fired heater, atmospheric tower with strippers, flash drum, exchanger banks, stabilizer, and treating area



Left: Entrance to Bakersfield refinery showing new administration building. Crude unit is in background. The large column is the 117-ft. atmospheric tower

by Robert Harwick
District Editor

ONE of the first units in the broad expansion and modernization program of Standard Oil Co. of California and subsidiary companies, has been recently completed at Standard's Bakersfield refinery in Kern County, California.

The new unit, a 20,000-bbl. per day installation, is one of three units at Bakersfield which, along with revision and rebuilding of other facilities, will provide an entirely new refinery for serving the San Joaquin Valley. The other two units now under construction are a Dubbs two-coil thermal cracker and a Unisol plant. Completion of these plants is scheduled for later in the year.

Prior to operation of the crude unit, distillate products from the refinery were refined in 3 continuous shell-still batteries; 12 stills in all. These are now out of service except for asphalt manufacture. With the replacement of this equipment by the new refinery units, Standard will provide distillate products to the San Joaquin Valley marketing area in larger volume and of higher quality than could be produced with the former installation.

The new crude unit consists of an elaborate heat-exchange setup, an atmospheric tower with three side-cut strippers, and a straightrun gasoline stabilizer. A products-treating section is incorporated within the unit.

Designed for Light Crude

The new crude-oil unit is engineered and designed specifically to handle light crude from the Midway section of Midway-Sunset field, or crude from Greeley field. Midway crude is naphthenic and runs 29°-30° A.P.I. gravity. Greeley crude is waxy and has an average gravity of 38° A.P.I. Crude enters the field tanks directly from the wells. It is relatively stable. B.s. and w. for both types of crude averages 1.2 per cent.

Interesting features of the installation are the atmospheric tower itself; the heat-exchange system that accounts for about 70 per cent of the energy required for distillation; the application of collected corrosion data in the selection of fired-heater tubes; and the products-treating section. Operation of the plant is a straightforward distillation of rather closely defined crude oils. The process is essentially heating, distilling, stabilizing, and treating.

The tank farm is about ½ mile from the crude unit. A booster pump is installed in the tank farm to pump crude to the unit charge pump, assuring positive flow. An interesting sidelight here is that cost of installing the booster pump was more than met by savings in pipe-line costs as the combination of pumps permitted use of a smaller-diameter pipe line.

The crude-oil charge passes through a heat-exchange system where it is heated in turn by diesel oil, intermediate reflux, and bottoms. From the heat exchangers the crude enters the fired heater at about 400° F. This heater has an absorbed heat rating of 50,000,000 B.t.u. per hour. Tubes are arranged in four parallel passes. Selection of heater tubes is based on experience and research data collected by Standard regarding the corrosive

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. . . roll up and let go the instant pipe is raised! No sticking!

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MISSION Slips are the only slips that grip and release instantly and positively. Today these famous slips lead throughout the world in sales and popularity.

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MISSION
MANUFACTURING CO.

G-143

Left: Showing pipeway between pump area and exchanger banks with stabilizer and cooling tower in rear. Derricks in background are part of Kern River field. Right: View of crude unit from cooling tower. Stabilizing column in foreground and flash drum in center rear with fired heater back of it

qualities of the crude handled. In the convection to transition section the tubes are carbon steel and in the upper radiant section they are 5 chrome-½ molybdenum. The remainder in the outlet radiant section are 18-8 stainless-steel material. Elevator platforms which may be raised or lowered approximately 40 ft. provide access to the heater return bends for inspection and maintenance.

The transfer line from the heater to the atmospheric tower is stainless steel as are the trays above and below the flash zone. The portion of the tower between these trays is stainless-steel lined.

Tower Weighs 180 Tons

The tower with a working length of 117 ft. weighs 180 tons and has a flash section 12½ ft. in diameter. The lower part of the vessel, below the flash section, is 7 ft. in diameter. Trays, other than the one above the crude charge inlet and the one below, are carbon steel.

The crude column cuts three fractions plus overhead and bottoms. The cuts are diesel oil, stove oil, and heavy gasoline. Light gasoline is the overhead product. Residue is cracking stock about 15° A.P.I. gravity. The three side streams go directly to a stripper column. Bottoms from the several stripping sections are cooled through heat exchange and then go to the refinery's treating area.

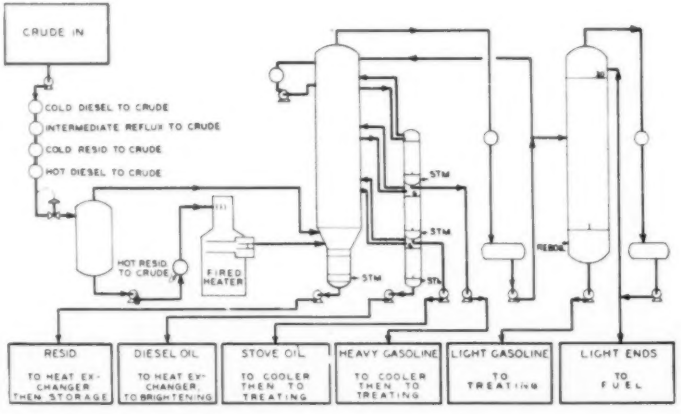
Tower overhead is condensed and stabilized. Light gasolines from the bottom of the stabilizer go directly to the treating area. Here sulfur is removed in two carbon-ring-packed caustic contactors. Heavy gasolines are treated in the same manner.

Stove oil is caustic washed, clarified, and water-washed in columns packed with carbon rings. After the wash, the stove-oil product is brightened by air blowing. Diesel oil is air-blown in a column packed with ceramic rings. After treating, all products go to storage.

With completion of the thermal cracker and the Unisol plant the crude unit will make light and heavy gasolines, stove and diesel oil as now, and in addition produce feed for the thermal cracker. Contractor on the project at Bakersfield is C. F. Braun & Co.

Along with the new processing facilities the Bakersfield modernization includes additional utilities, tanks, lines, rail, and truck-loading racks. New facilities for handling and storage of chemicals, and for waste disposal. There are new shops, locker rooms, and a modern laboratory. A new administrative headquarters for the refinery is now in use.

Flowsheet of 20,000-bbl. per day crude-distillation unit at Standard Oil Co. of California's Bakersfield refinery



Joe— You can't beat this Taylor Mercury Manometer for performance. There's no seizing — thanks to TEFLON BEARING

SATISFIED customers tell us the "Teflon" Pressure-Tight Bearing makes the new Taylor Mercury Manometer seize-proof and practically leak-proof. It's ideal wherever you need something *better* than present differential pressure measuring instruments. Teflon is a synthetic plastic that minimizes friction and eliminates seizing common to metal-to-metal bearings. It resists corrosion because of unmatched chemical inertness. That's why this Taylor Manometer ends pressure-tight bearing troubles that may have blocked precise control for years. Other features:

1. Great Power—thanks to extra-big float with extra-long travel. Micro-inch finished shaft with Teflon bearings "float" this power right through to the pen.

2. High Accuracy—inherent straight-line calibration.

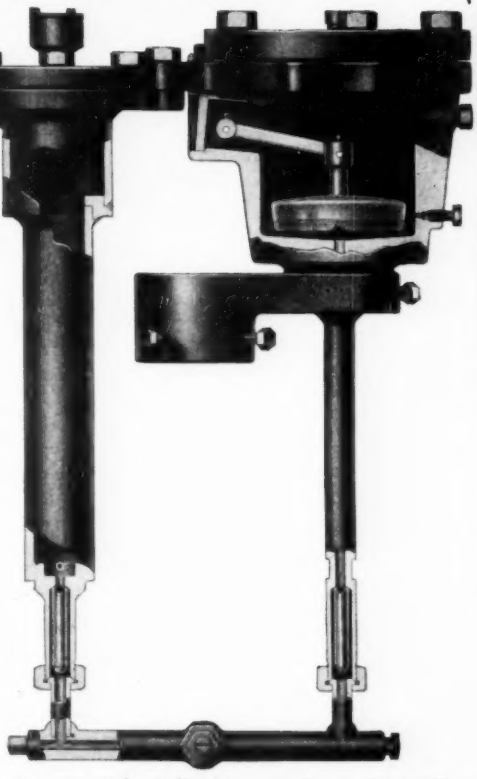
3. Positive Actuation—high energy output. **(a) Big 3 5/16" float. (b) Long float travel—1". (c) Simple lever system. (d) Teflon in pressure-tight bearing surfaces** for efficient use of power. **(e) Jewelled thrust bearing.**

4. Dependable Performance. (a) Submerged check valves give positive shut-off. **(b) Unique damping valve** adjustable under full pressure without leakage. **(c) Ample room** in mercury chambers to accommodate surges or pulsating flows. **(d) Teflon holds pressure,** yet lets shaft turn freely, giving long service.

5. Great Adaptability. (a) Six interchangeable range tubes: 10", 20", 50", 100", 200" and 400" of water. **(b)** All ranges except 10" may be over or under ranged 33⅓%. **(c)** Both side and top pressure connections. **(d) Two manometers** can be mounted on back of single case for recording two Flows or for Ratio-Flow control. **(e)** A union coupling prevents distortion of bearing housing—eliminates binding or friction caused by wrench-torque.

6. Ease of Maintenance. (a) Low pressure chamber cover permits easy access to float and lever arm during calibration. **(b) Entire pressure-tight bearing** easily and economically replaced.

Ask your Taylor Field Engineer, or write for bulletin 98182. Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.



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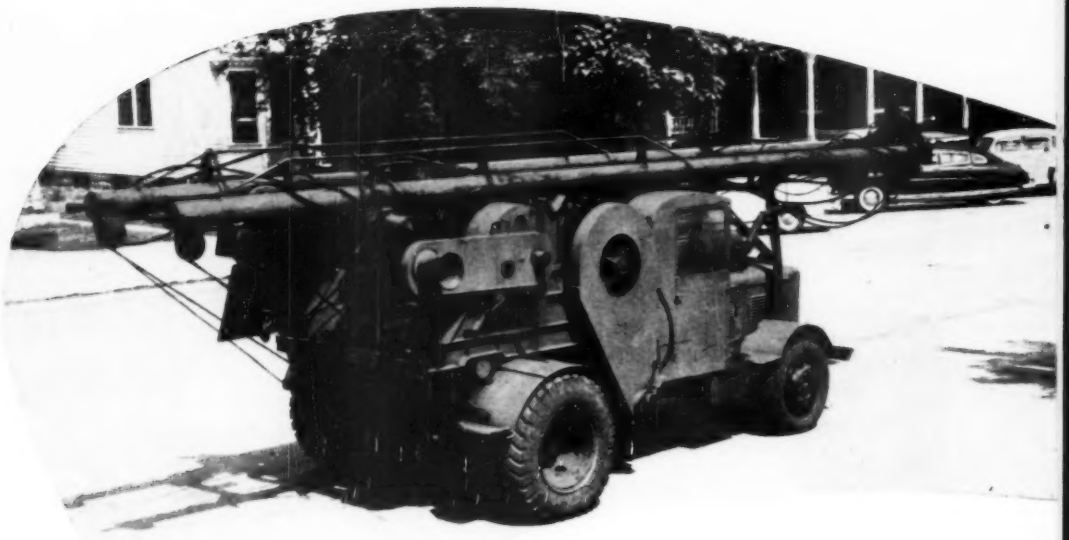

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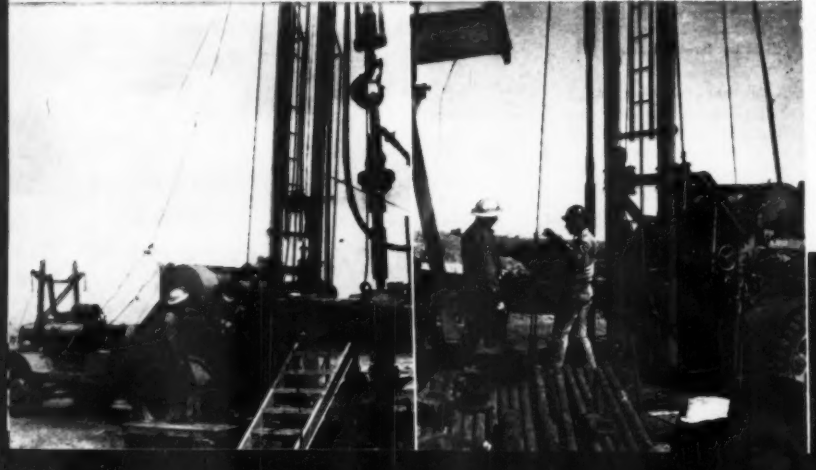
Take advantage of the profit-making possibilities of the Mobilhoist. You can make more money per dollar invested than with any other machine of its type in the world. Send today for our Mobilhoist catalog and price list.

A fast, economical workover job using a Mobilhoist with rotary table drive assembly. Well was deepened with 2⅞" drill pipe. Rig-up with 55-foot double leg mast was accomplished within two hours. (Extreme left photo.)



Well servicing is fast and profitable because the wide range of operating speeds and air-controlled friction clutches speed up every job. Note how adjustable controls enable operator to work as one of the crew. (Left photo.)

"Cardwell's" reputation in oil fields for building "Tough Iron" comes from the use of alloy steels and heat-treatment. This "know how" cannot be copied.

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Large dual tires, adequate size engine and a wide selection of transmission speeds provide the Mobilhoist with traction and power to get on the job.

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1. Well servicing to 4,000 feet.
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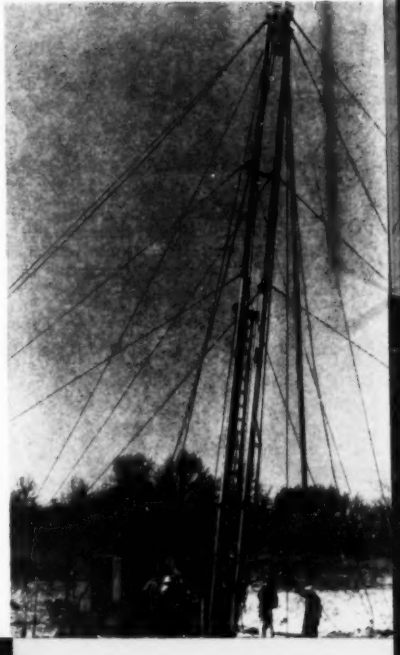

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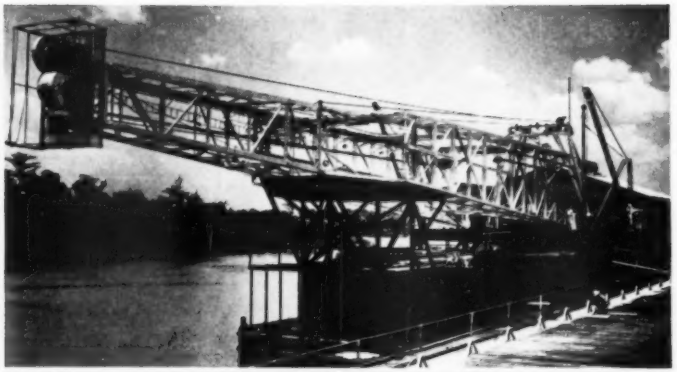
Mobilhoist with jerkline spudder assembly deepening a 3,300-foot well in Oklahoma. Air-disc friction clutches in both drums give fast, positive engagement.



C. G. Glasscock Drilling Co. of Corpus Christi commissioned this $500,000 submersible drilling rig recently in the Beaumont yard of Bethlehem Steel Co.'s shipbuilding division. It is Glasscock's first marine rig and will be one of the few such rigs operating in the South Texas area. Photographs show mast in three stages of erection

SUBMERSIBLE DRILLING BARGE

HALF-MILLION-DOLLAR

Designed for 15,000-ft. drilling in shallow water

by Leigh S. McCaslin, Jr.
District Editor

RECENTLY C. G. Glasscock Drilling Co. of Corpus Christi commissioned a $500,000 submersible drilling barge designed for drilling to 15,000 ft. in shallow water. It is Glasscock's first marine rig and will be one of the few such rigs operating in the South Texas area.

The new barge was engineered and built in the Beaumont yard of Bethlehem Steel Co.'s shipbuilding division. First contract for the rig will be on an Atlantic Refining Co. test near Shamrock Cover, which is in Laguna Madre near Corpus Christi Bay.

The U-shaped barge is 155 by 52 by 11 ft., with a drilling slot 88 ft. long and 8 ft. wide. The draft (light) of the barge is 3½ ft. and total weight (light) is 700 short tons (1,400,000 lb.). It can be operated in 10 ft. of water. Where necessary, a shell fill can be installed to permit operation in deeper water. The barge is of all-welded construction, longitudinally framed with five transverse and two longitudinal bulkheads, forming ballast and fresh-water tanks and rake end compartments. The outside of the barge is protected by two 8-in. extra-heavy split-pipe fenders.

A feature of the rig is the 136-ft.-high, double-bulge, portable jackknife derrick which can rack 192 stands of 4½-in. o.d. drill pipe in one bulge. The second bulge is normally used for tubing during workovers, but could be used for additional drill pipe if necessary. The derrick is rated at 800,000 lb. by the manufacturer.

Major Equipment Items

Major items of drilling equipment mounted on the barge are as follows:

1—Ideal 125 draw works with sand reel, 1,200 input horsepower, 6 speeds, rated at 12,500 ft., with 4½-in. drill pipe and 15,000 ft. with 3½-in. drill pipe.

No. 366 Gyrol fluid-drive group, Type B, 2 sections.

2—PTD 8-cylinder diesel engines, 535 hp., 8½ by 10½ (drive draw works).

1—C350 slush pump, 500 hp., 7¾ by 18 (driven by the main drive group).

1—7¼ by 14 Gardner-Denver pump driven by PTD 6-cylinder diesel engine of 325 hp.

1—C150 slush pump, 6¾ by 12, 165 hp., driven by PTD 6-cylinder diesel.

1—SHS 20½-in., 500 r.p.m., rotary table.

1—R3 swivel, 200 ton.

1—CA30 hook, 300 ton.

1—548 548 T traveling block, 300 ton.

2—Stewart & Stevenson 60 kw., diesel-driven, a.c. generator plants.

String of 4½-in. Grade E drill pipe.

It is interesting to note that only one pump is driven from the main drive group. Another point of interest is the fact that no idler is being used on the belt drive. The fluid-drive group used on the rig is a rela-

C. G. Glasscock, Jr., C. G. Glasscock, Sr., and J. C. Storm, co-owners of Glasscock Drilling, in front of the draw works of their new 15,000-ft. swamp barge

C. G. Glasscock Drilling Co., Corpus Christi

C. G. Glasscock Drilling Co. is owned by C. G. Glasscock, Sr., C. G. Glasscock, Jr., and James C. Storm. The senior Glasscock, who organized the company and later took his son and Storm into partnership, has been a contractor since 1925. He started in the oil business as a rig builder at Burkburnett, Tex., in 1919. With his brother, Lonnie, he also is an active independent oil operator and producer.

The company currently is operating six rigs. Five of these are located in Southwest Texas. They include two steam-powered rigs, one with a depth capacity rating of 10,000 ft. and the other 7,500 ft.; two diesel-powered rigs, one rated at 11,000 ft. and the other 10,000 ft., and one butane rig with a rating of 15,000 ft. The other rig, a 7,500-ft., diesel-powered assembly, is in North Texas. In addition, the company has just commissioned the 15,000-ft. drilling barge discussed in the accompanying article.

In addition to the owners, key personnel include: Lee McMillian, production superintendent; "Rusty" Cunningham, Gus Hellman, Joe Hellman, "Kid" Dunlap, Ray Ford and Russell Saunders, tool pushers; D. W. Streety, diesel engineer; Jack Daigle, mud engineer, and Howard Rose, North Texas production superintendent.

Among the more important discovery wells drilled by the company were those of West Ranch field, Jackson County, and East Long Mott field, Calhoun County, both on the Texas Gulf Coast, and Jack County Regular in Jack County, North Texas.

Glasscock employs about 135 people, and uses two airplanes and six mobile telephones to facilitate its operations.

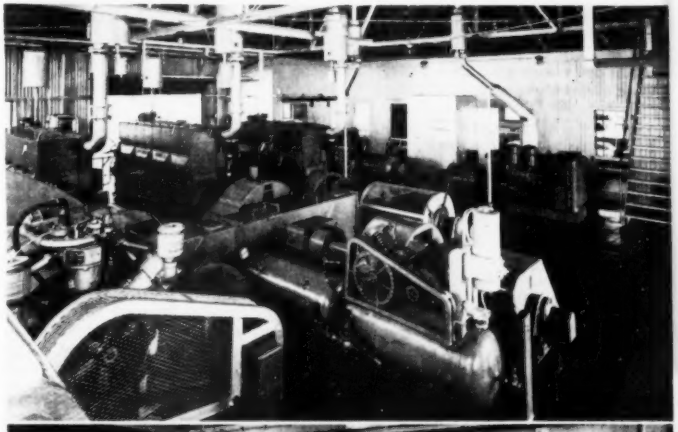
C. G. GLASSCOCK DRILLING UNIT NO. 4 CHARACTERISTICS AND CAPACITIES

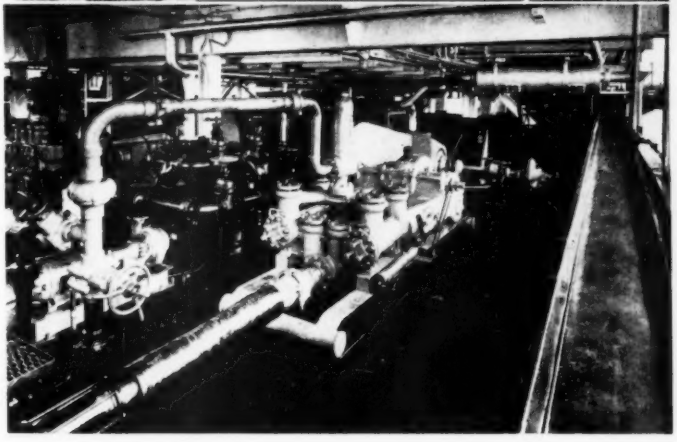
Length	155 ft.
Breadth	52 ft.
Depth	11 ft.
Draft (light)	3½ ft.
Operating mud pit	255 bbl.
Settling mud pit	215 bbl.
Reserve mud pits (2)	950 bbl.
Fuel oil storage tanks (2)	780 bbl.
Dry-mud houses (2)	3,500 cu. ft.
Fresh-water storage	2,000 bbl.
Ballast tanks	11,800 bbl.
Potable water	900 gal.
Total weight (light)	700 short tons
Jack-knife mast	136 ft.
Capable of drilling	15,000 ft.

tively new development in the field of drilling equipment. As can be seen in some of the accompanying photographs, a considerable amount of clear deck space has been provided around the various pieces of equipment. This has been done to facilitate maintenance and repair, as well as to provide safe operating conditions for the crew.

On the forward or slot end of the barge are the two fuel-oil tanks

(Continued on page 126)





***Right, above:** This view on the derrick-floor level shows, in the left background, the two 535-hp. and one 325-hp. diesel engines powering Glasscock's new rig. The two larger engines drive the draw works while the smaller one powers one of the slush pumps. In the foreground are air compressors driven from the main drive group. In the right background can be seen two 60-kw., diesel-driven, a.c. generator plants. Right: The 6¾-by-12, 165-hp. slush pump in the foreground is driven by the six-cylinder diesel engine behind it. The 7¼-by-14 slush pump in the left rear is driven by the main drive group on the deck above. The 12 by 18-in. mud ditch from the shale shaker runs down the right side of the picture*

COMPRESSOR CALCULATIONS

As applied to the transmission of Natural Gas

by Henry C. Owen, Jr.

Equations are derived leading to the development of a new method for accurately and rapidly calculating the final temperature and theoretical horsepower involved in isentropic compression. This method is illustrated in the solution of two problems, which are typical of those involved in the natural gas transmission industry. The effect of varying n on the calculated theoretical horsepower and volumetric efficiency is studied. A loss factor chart is also presented, which can be used to calculate brake horsepower.

NUMEROUS tests have shown that compression of natural gas is practically isentropic under ordinary conditions of transmission using reciprocating compressors. This can be substantiated by a rough calculation to show that the heat transferred to the gas within a compressor cylinder is negligible during the time interval of about 0.1 second. However, the heat transferred to the gas left in the clearance volume at the end of the stroke is usually great enough to cause the value of n for the expansion of this gas to be less than the value of n for the compression. The difference in the two values of n varies with the design of the cylinder, the temperature of the cooling fluid, the rate of compression, and the amount of clearance. This difference in the two values of n decreases with an increase in the clearance, and the recent use of clearances as great as 80 per cent in order to operate at substantially the same horsepower over a reasonably wide range of compression ratios should cause a negligible difference in these values.

The equation for theoretical horsepower developed in this article is based on equal values of n for both the compression and expansion of the gas. If the actual value of n for the expansion is less than that for the compression, the equation will give results only slightly higher than those obtained if the true value of n for the expansion were used. This may be seen later when the effect of varying n on the calculated theoretical horsepower, as well as the effect of varying n on the calculated final temperature in an isentropic expansion and on the volumetric efficiency of a compressor, is investigated over the range of compression ratios and n values usually encountered in the transmission of natural gas.

The equation for isentropic change

$$PV^n = B \text{ (a constant)}$$

has long been over simplified by the assumption of perfect gas laws in its derivation. In the past, a value of n has been used corresponding to the value of K at atmospheric pressure. Edmister,[1] however, has suggested the use of a value of K in the theoretical horsepower equation

$$T.HP. = \frac{144\,P_1 V_1 K}{33{,}000\,(K-1)} \left[\left(\frac{P_2}{P_1} \right)^{(K-1)/K} - 1 \right]$$

which is the average of the value of K at the beginning of the compression and that at the end of the compression. This is equivalent to the use of this average value of K in the place of n in the equation

$$PV^n = B$$

One of the main purposes of this article is to develop a rapid and accurate method of calculating the true value of n to use in this equation and in the equation developed for calculating the final temperature and theoretical horsepower in isentropic compression.

It is easy to determine the final temperature and the theoretical work required for an isentropic compression if there is available an enthalpy-entropy diagram for the gas being compressed, since the entropy remains constant during the compression. However, such diagrams are not available for all gases. G. G. Brown[2] has published a set of enthalpy-entropy diagrams for natural gases having specific gravities of 0.6 to 1.0, but they are accurate to only two significant figures and are limited to natural gases having the pseudo-critical properties given on each diagram. If the heat capacity and P-v-T relationship are known for a gas over the range of compression, it is possible to calculate the final temperature and the theoretical work required; but this method is too laborious to use for routine compressor design calculations. York[3] has presented a method for calculating these values involving a generalized correlation for the isothermal change in entropy and enthalpy.

Recently Edmister and McGarry[4] presented an accurate and rapid method of calculating the temperature and enthalpy changes for isentropic compression which required the determination of the exponent in the equation relating the change in temperature to the change in pressure. This exponent is calculated from values derived from a generalized compressibility chart, the value of C_p at atmospheric pressure, and an isothermal pressure correction to C_p, which is given as a generalized function of T_r and P_r. As in York's method, the theoretical work of compression is found by calculating the enthalpy change between initial and final conditions using the calculated final temperature, a mean value of C_p at atmospheric pressure, and the isothermal pressure corrections to the enthalpy at the terminal conditions, which are given as a generalized correlation. It is believed that the method presented in this article will allow an accurate determination of the final temperature and the theoretical work

Henry C. Owen, Jr., joined Texas Gas Transmission Corp. in June 1949, where he is employed as assistant to chief engineer. He received a B.S. degree in chemical engineering from Texas A. & M. in 1942, an M.S. degree in chemical engineering from Illinois Institute of Technology in 1949, and a master of gas technology degree from Institute of Gas Technology in 1949. Before joining his present company, he worked for 5 years in the chemical industry and for Ford, Bacon & Davis, Inc., engineers for Michigan-Wisconsin Pipe Line Co., during the summer months of 1948.

required for isentropic compression of natural gas at typical reciprocating compressor stations on transmission lines in as short or shorter time than required by the previously mentioned methods.

Equations for Proposed Method

In this section equations are derived leading to the development of the proposed method. These equations are perfectly general, except as noted, and contain some features which are believed to be new.

An equation for the relation of T to v in an isentropic change is found by starting with the following fundamental equation for internal energy

$$dE = C_v dT + [T(\partial P/\partial T)_v - P]\,dv \quad (1)$$

For an isentropic change,

$$dE = -Pdv \quad (2)$$

and

$$C_v dT + T(\partial P/\partial T)_v\,dv = 0 \quad (3)$$

The following fundamental relationship of C_p to C_v is used to eliminate $(\partial P/\partial T)_v$:

$$C_p = C_v + T\left(\frac{\partial P}{\partial T}\right)\left(\frac{\partial v}{\partial T}\right) \quad (4)$$

Thus,

$$C_v dT + \frac{C_p - C_v}{(\partial v/\partial T)_p}\,dv = 0 \quad (5)$$

Differentiating the compressibility factor definition of a real gas gives

$$\left(\frac{\partial v}{\partial T}\right) = \left[\frac{\partial\,(ZRT/P)}{\partial T}\right]$$

$$= R/P\,[Z + T(\partial Z/\partial T)_p]$$

$$= v/T\,[1 + T/Z\,(\partial Z/\partial T)_p]$$

$$= v/T\,(1 + A) \quad (6)$$

where $A = T/Z\,(\partial Z/\partial T)_p$

Then by substitution of (6) into (5)

$$C_v dT + \frac{C_p - C_v}{v/T\,(1 + A)} = 0 \quad (7)$$

Rearranging and substituting K C_p/C_v gives

$$\left(\frac{1 + A}{K - 1}\right)\frac{dT}{T} + \frac{dv}{v} = 0 \quad (8)$$

Equation 8 may be integrated if

$$\frac{1 + A}{K - 1}$$

may be considered as a constant. Thus,

$$\left(\frac{1 + A}{K - 1}\right)\ln\frac{T_2}{T_1} + \ln\frac{v_1}{v_2} = 0$$

and

$$v_1/v_2 = (T_2/T_1)^{1/(n-1)} \quad (9)$$

where $n = \dfrac{K + A}{1 + A}$

The relationship of P to T is derived as follows:

$$\frac{v_1}{v_2} = \frac{(P_2)\,(Z_1)\,(T_1)}{(P_1)\,(Z)\,(T_2)} = \left(\frac{T_2}{T_1}\right)^{1/(n-1)}$$

$$T_2/T_1 = \left(\frac{P_2 Z_1}{P_1 Z_2}\right)^{(n-1)/n} \quad (10)$$

The relation of P to v is derived as follows:

$$\frac{v_1}{v_2} = \left(\frac{P_2 Z_2}{P_1 Z_1}\right)$$

$$\frac{1}{\left(\frac{P_2 Z_1}{P_1 Z_2}\right)^{(n-1)/n}} = \left(\frac{P_2 Z_1}{P_1 Z_2}\right)^{1/n} \quad (11)$$

Thus,

$$\frac{P_2 Z_1}{P_1 Z_2} = \left(\frac{v_1}{v_2}\right)^n \quad (12)$$

and

$$\frac{Pv^n}{Z} = \text{B, a constant} \quad (13)$$

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In most textbooks this equation for an ideal gas is given as

$$PV^n = B$$

A rigorous application of Equations 9, 10, 12, and 13 to most problems requires an incremental solution involving a series of steps in which the exponent for each step can be considered a constant. However, an incremental solution is quite time consuming so that it is desirable to use a mean value for the exponent over the entire range of variables if possible. As will be shown later in the solution of two problems typical to the natural gas transmission industry, an arithmetical average of the values of the exponent at the terminal conditions gives results which are in very good agreement with those obtained from incremental solutions.

The equation for the theoretical horsepower required in an isentropic compression process is derived as follows using the idealized indicator PV diagram given in Fig. 1:

For cycle FHSJ,

$$W = -\int_{P_1}^{P_2} VdP \qquad (14)$$

Substituting for V its value derived from Equation 13 results in the following equation:

$$W = -\int_{P_1}^{P_2} (ZB/P)^{1/n}\, dP = (Z_m/Z_1)^{1/n} \cdot n/(n-1)\, P_1 V_H\, [1 - (P_2/P_1)^{(n-1)/n}]$$

where Z_m is the mean value of Z during the compression of the gas. Similarly for the cycle GHSL,

$$W = (Z_m/Z_1)^{1/n} \cdot n/(n-1)\, P_1 V_I\, [1 - (P_2/P_1)^{(n-1)/n}] \qquad (15)$$

where V_I = intake volume of compressor = $V_H - V_G$

This derivation, of course, involves the assumption of the same value for n, for the expansion as for the compression of the gas.

In order to obtain an equation that will express the theoretical horsepower required for the compression of each million standard cubic feet of gas per day (M.M.S.C.F.D.), V_I is converted to its equivalent in standard cubic feet as follows:

$$V_I = V_a Z_1 \left(\frac{P_a T_1}{P_1 T_a}\right)$$

$$W = (Z_m/Z_1)^{1/n} \cdot n/(n-1)\, P_a\, V_a\, Z_1\, (T_1/T_a)\, [1 - (P_2/P_1)^{(n-1)/n}]$$

$$\text{T.HP. per M.M.S.C.F.D.} = 3.030\, (Z_m/Z_1)^{1/n} \cdot n/(n-1)\, P_a\, Z_1\, (T_1/T_a)\, [1 - (P_2/P_1)^{(n-1)/n}] \qquad (16)$$

The factor $(Z_m/Z_1)^{1/n}$ is negligible in most cases, the ratio of Z_m to Z_1 being practically 1.00.

In order to obtain an equation for the capacity of a compressor cylinder, it is first necessary to derive an equation for the volumetric efficiency (E_v). This is done as follows using the idealized indicator diagram given in Fig. 1.

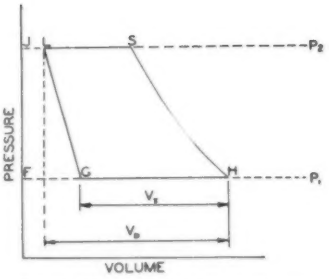

Fig. 1—Idealized indicator PV diagram

$$V_G = V_L \left(\frac{Z_1 P_2}{Z_2 P_1}\right)^{1/n}$$

$$E_v = \frac{V_I}{V_D} = \frac{V_H - V_G}{V_H - V_L} = \frac{V_H}{V_H - V_L} - \frac{V_L\, (Z_1P_2/Z_2P_1)^{1/n}}{V_H - V_L}$$

where

V_I = intake volume

V_D = piston displacement volume.

$$c = \frac{V_L}{V_H - V_L} \text{ and } 1 + c = \frac{V_H}{V_H - V_L}$$

where c = clearance.

$$E_v = 1 + c \left[1 - \left(\frac{Z_1P_2}{Z_2P_1}\right)^{1/n}\right] \qquad (17)$$

The position of Z_1/Z_2 in this equation differs from its position in the equation used by R. S. Ridgway,[5] which is given as follows:

$$E_v = k + c \left[1 - \left(\frac{Z_1}{Z_2}\right)\left(\frac{P_2}{P_1}\right)^{1/n}\right]$$

In most cases encountered in the transmission of natural gas, the ratio of Z_1 to Z_2 is practically 1.00 so that this correction due to compressibility of the gas is negligible. However, it is believed that Equation 16 is a better basis for a practical equation for E_v than one which does not have this correction, because this correction may be significant in some cases.

The capacity of a compressor cylinder expressed in terms of standard conditions may be expressed by the following equation:

$$V_a \text{ (capacity)} = \frac{(V_D)\ (E_v)\ (P_1)\ (T_a)}{(Z_1)\ (P_a)\ (T_1)} \qquad (18)$$

Cooper-Bessemer Corp. has developed the following equation for the actual volumetric efficiency, which gives efficiencies agreeing with the results of actual tests within ±1.5 per cent for clearance values of 30 per cent or less. The equation is less accurate for clearance values greater than 30 per cent, with the discrepancy becoming greater as the clearance value increases.

$$E_v = 1.00 + c\, [1 - (P_2/P_1)^{1/n}] - 0.010\, (P_2/P_1) \qquad (19)$$

Application of Proposed Method

The proposed method is outlined as follows and is illustrated by the sample calculations for Problem 1, and by a summary of results for Problem 2.

Given: Initial and final pressures, initial temperature, and the analysis of the gas.

Find: Final temperature and theoretical horsepower.

Step 1.—Calculate pseudo-critical pressure and temperature of the gas.

Step 2.—Calculate the reduced pressure and temperature at the initial condition, and obtain Z_1 from a suitable compressibility factor chart.

Step 3.—Determine the actual value of K for the gas at the inlet conditions.

Step 4.—Calculate A at inlet conditions using ΔZ and ΔT at constant pressure in place of $(\partial Z/\partial T)_P$.

Step 5.—Calculate n and then $(n-1)/n$ at inlet conditions.

Step 6.—Calculate the final temperature by means of Equation 10 assuming that $Z_1/Z_2 = 1.00$ and that the mean value of n for the compression is the value of n at the inlet conditions.

Step 7.—Using this assumed value of T_2, calculate the value of $(n-1)/n$ at the final pressure, repeating Steps 2, 3, 4, and 5.

Step 8.—Using a value of $(n-1)/n$, which is the average of the value of $(n-1)/n$ at the inlet conditions and the value of $(n-1)/n$ at P_2 and this assumed value of T_2, calculate T_2 by means of Equation 10.

Step 9.—Compare this value of T_2 with the value assumed in Step 7.

Step 10.—If this value of T_2 does not agree closely with the value assumed in Step 7, use this calculated value of T_2 as the assumed value and repeat Steps 7, 8, and 9 until the calculated value agrees closely with the assumed value of T_2.

Step 11.—Use an average value of $(n-1)/n$ at the terminal conditions to solve for T.HP. per M.M.S.C.F.D. by Equation 16.

This method is illustrated in the solution of two compressor problems

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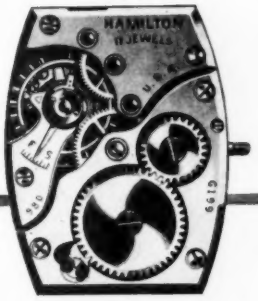

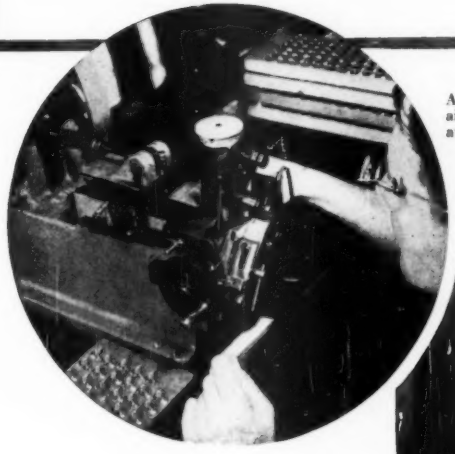

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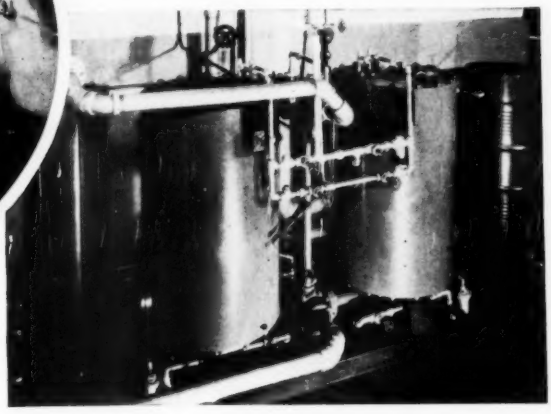

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typical to the natural-gas transmission industry, Problem 1 being a typical problem encountered in main line stations and Problem 2 a typical problem in field or gathering stations. In order to determine a standard by which the results of this method could be judged, an incremental solution was also determined and in each case the results of this method agreed well with the results of the incremental solution. A 20-in. log-log slide rule was used in these calculations.

Problem 1

Given: $P_1 = 534.7$ psia.; $T_1 = 65°$ F. (524.6° R.); $P_2 = 834.7$ psia.; the analysis of the gas is given as follows:

Component	Mol %
Methane	95.45
Ethane	3.74
Propane	0.81

Find: Final temperature and theoretical horsepower.

Sample calculations:

1. Pseudo-critical properties of gas.

Component	Mol%	T_c, °R	(Mol%) × (T_c)	P_c, psia	(Mol%) × P
Methane	95.45	343.1	327.4	673	642.5
Ethane	3.74	549.7	20.5	708	26.5
Propane	0.81	665.8	5.4	617	5.0
			353.3		674.0

therefore, $T_c = 353$ °R. and $P_c = 674$ psia.

2. Compressibility factor at inlet conditions (Z_1)

$$Pr = 534.7/674 = 0.795$$

$$Tr = 524.6/353 = 1.486$$

Using the generalized compressibility factor chart for natural gases prepared by G. G. Brown,[1]

$$Z_1 = 0.918$$

3. Actual value of K_1

The following individual values of K are taken from the chart prepared by W. C. Edmister,[2] which gives actual values for K for various hydrocarbons as a function of T_r and P_r.

Component	Mol%	K	(Mol%) × K
Methane	95.45	1.43	1.365
Ethane	3.74	1.19	0.0445
Propane	0.81	1.12	0.0091
		K_1 =	1.419

4. Calculation of A.

Pr	Tr	Z
0.795	1.5	0.920
0.795	1.4	0.900
		ΔZ 0.020

$$\Delta T = (1.5 - 1.4)(353) = 35.3$$

$$A = (T\ Z)(\Delta Z/\Delta T),$$

$$= \frac{(524.6)\ (0.020)}{(0.918)\ (35.3)} = 0.324$$

5. Calculation of n_1 and $(n-1)/n$

$$n = \frac{K + A}{1 + A} = \frac{1.419 + 0.324}{1.324}$$

$$= 1.316$$

$$(n-1)/n = 0.240$$

6. Calculation of final temperature (T_2) assuming that $Z_2/Z_1 = 1.00$ and that the average value of $(n-1)/n$ is 0.240.

$$T_2 = T_1\ (P_2Z_1/P_1Z_2)^{(n-1)/n} \qquad (10)$$

$$T_2 = (524.6)\ (834.7/534.7)^{0.240}$$

$$= 584.0 \text{ R}$$

7. Second trial and error solution Assume $T_2 = 584.0$ R.

a. Z_2

$$P_c = 834.7/673 = 1.24$$

$$T_r = 584.0/353 = 1.65$$

$$Z_2 = 0.918$$

b. K

Component	Mol%	K	(Mol%) × K
Methane	95.45	1.575	1.504
Ethane	3.74	1.25	0.0467
Propane	0.81	1.17	0.0095
		K_2 =	1.560

c. A.

Pr	Tr	Z
1.24	1.7	0.927
1.24	1.6	0.909
		ΔZ 0.021

$$A = \frac{(584)\ (0.021)}{(0.918)\ (35.3)} = 0.378$$

d. $$n = \frac{1.560 + 378}{1.378} = 1.407$$

$$(n-1)/n = 0.289$$

e. Average value of $(n-1)/n$

$$= \frac{0.240 + 0.289}{2} = 0.2645$$

f. $$T_2 = (524.6)\left(\frac{(834.7)\ (0.918)}{(534.7)\ (0.918)}\right)^{0.2645}$$

$$= 590.0 \text{ R}$$

8. Third trial and error solution

Assume $T_2 = 590.0$ R

a. Z_2

$$P_c = 1.24$$

$$T_r = \frac{590}{353} = 1.67$$

$$Z_2 = 0.920$$

b. Values of K_2, A_2, n_2, $(n-1)/n$ at final conditions, and the average value of $(n-1)/n$ agree with those obtained in the second trial and error solution.

c. $$T = (524.6)\left(\frac{(834.7)\ (0.918)}{(534.7)\ (0.920)}\right)^{0.2645}$$

$$589.5 \text{ R}$$

This value of 589.5 R for T_2 agrees closely with the value of 590.0 R assumed in this solution so that it may be taken as the final temperature.

9. The average value of $(n-1)/n$ is substituted in Equation 16 as follows:

T.HP. per M.M.S.C.F.D

$$= \frac{(3.030)}{(0.2645)}(P_c)(0.918)\frac{(524.6)}{T_c}$$

$$\times [1 - (834.7/534.7)^{0.2645}]$$

$$= 690\ (P_c/T_c)$$

If P = 14.6 psia and T = 60 F = 519.6 R,

T.HP. per M.M.S.C.F.D. = — 19.40

The factor $(Z_c/Z_1)^{1/n}$ is practically 1.00 so that it is not included in the preceding calculation.

Results of incremental solution of Problem 1:

By substituting the proper values from Table 1 in Equation 10, a mean value of $(n-1)/n$ is obtained as 0.2491. This value is substituted in Equation 16 as follows:

$$\text{T.HP. per M.M.S.C.F.D} = \left(\frac{3.030}{0.2491}\right)(P_c)(0.918)\left(\frac{524.6}{T_c}\right)(1 - 1.561^{0.2491})$$

$$= -687\ (P_c/T_c)$$

TABLE 1—CALCULATED VALUES OF INCREMENTAL SOLUTION

P, psia	T, °R	Z	K	A	n	$(n-1)/n$	Average value of $(n-1)/n$
423.7	524.6	0.918	1.419	0.324	1.316	0.240	
							0.242
584.7	536.0	0.918	1.424	0.314	0.323	0.244	
							0.2435
634.7	547.2	0.915	1.429	0.339	1.321	0.243	
							0.2433
684.7	556.5	0.917	1.438	0.361	1.322	0.2436	
							0.2475
734.7	566.0	0.918	1.462	0.375	1.336	0.2515	
							0.2615
784.7	575.9	0.918	1.506	0.356	1.373	0.2716	
							0.283
834.7	586.0	0.919	1.575	0.379	1.390	0.2942	

TABLE 2—SUMMARY OF CALCULATIONS FOR PROBLEM 1

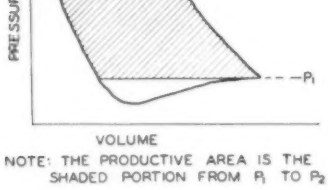
Method used in calculation—	Value of n used	T_2, °R.	T.HP. per M.M.S.C.F.D.
Proposed method	1.361	589.5	—19.40
Incremental solution	1.332	586.0	—19.32
Method using K at 14.7 psia.	1.300	581.5	—19.25

TABLE 3—CALCULATED VALUES OF INCREMENTAL SOLUTION

P_2, psia.	T_2, °R.	Z	K	A	n	$(n-1)/n$	Average value of $(n-1)/n$
114.7	524.6	0.981	1.304	0.076	1.283	0.2206	
							0.220
129.7	539.0	0.981	1.302	0.076	1.281	0.2195	
							0.219
149.7	556.3	0.980	1.302	0.080	1.280	0.2187	
							0.219
174.7	575.5	0.980	1.302	0.080	1.280	0.2187	
							0.217
204.7	595.5	0.980	1.302	0.103	1.274	0.2152	
							0.218
239.7	616.3	0.979	1.302	0.071	1.282	0.220	
							0.2185
279.7	637.5	0.978	1.301	0.068	1.277	0.217	
							0.216
314.7	654.0	0.979	1.301	0.104	1.273	0.2145	
							0.214
364.7	675.0	0.979	1.301	0.107	1.272	0.214	
							0.2145
414.7	693.7	0.979	1.301	0.100	1.274	0.215	
							0.214
464.7	710.2	0.980	1.300	0.113	1.270	0.213	

TABLE 4—SUMMARY OF CALCULATIONS FOR PROBLEM 2

Method used in calculation—	Value of n used	T_2, °R.	T.HP. per M.M.S.C.F.D.
Proposed method	1.277	710	—71.65
Incremental solution	1.277	710	—71.65
Method using K at 14.7 psia.	1.300	724	—72.40



NOTE: THE PRODUCTIVE AREA IS THE SHADED PORTION FROM P_1 TO P_2

Fig. 2—Actual indicator PV diagram

If P_o = 14.6 psia. and T_o = 60° F,

T.HP. per M.M.S.C.F.D. = —19.32.

Comparison of results with those calculated using a value of n equivalent to K at atmospheric pressure:

K = 1.300 for gas at 14.7 psia. and 60° F.
T_2 = 581.5 °R.

If P_o = 14.6 psia. and T_o = 60° F,

T.HP. per M.M.S.C.F.D. = 19.25

Problem 2

Given: P_1 = 114.7 psia.; T_1 = 65° F; P_2 = 464.7 psia.; the gas analysis is the same as in Problem 1.

Find: Final temperature and theoretical horsepower.

Discussion of Problems 1 and 2

It will be noticed in Tables 2 and 4 that the value of T_2 calculated using the proposed method differs by 8° in Problem 1 and by 14° in Problem 2 from the value calculated using the value of K at atmospheric pressure for n. The value of T_2 calculated by the proposed method was greater or less than the value calculated using an n of 1.300 depending upon whether the value of n used in the proposed method was greater or less than 1.300. The value of T_2 calculated by the proposed method differs from the value of T_2 calculated by the incremental solution by only 3.5° in Problem 1; in Problem 2 the two values agree exactly.

TABLE 5
Percentage Difference Between Value of Theoretical Horsepower Calculated Using an n of 1.4 and an n of 1.3

Compression ratio	Percentage difference in T.HP.
1.00	0.00
1.50	1.27
2.00	2.08
3.00	3.3
5.00	4.7

In Problem 1 the value of theoretical horsepower calculated by the proposed method is 0.77 per cent greater than the value calculated using an n of 1.300, while in Problem 2 the value is 1.04 per cent less. Both values of theoretical horsepower calculated using the n derived by an incremental solution agree closely with the respective values calculated by the proposed method. The percentage difference between values of theoretical horsepower calculated using an n of 1.4 and an n of 1.3 are given in Table 5; these differences for such a large variation in the value of n

TABLE 6—PERCENTAGE DIFFERENCE BETWEEN VALUE OF E_c CALCULATED BY EQUATION 19 USING AN n OF 1.4 AND AN n OF 1.3

Compression ratio	Percentage difference for following values of c						
	0.04	0.08	0.12	0.16	0.20	0.50	0.80
1.3	0.07	0.14	0.22	0.29	0.37	1.01	1.76
1.5	0.12	0.25	0.38	0.52	0.66	1.87	3.47
1.7	0.19	0.38	0.59	0.80	1.02	2.98	6.03
2.0	0.27	0.56	0.86	1.19	1.54	5.06	12.2
3.0	0.60	1.27	2.04	2.90	3.90	22.4	
5.0	1.37	3.11	5.35	8.39	12.7		

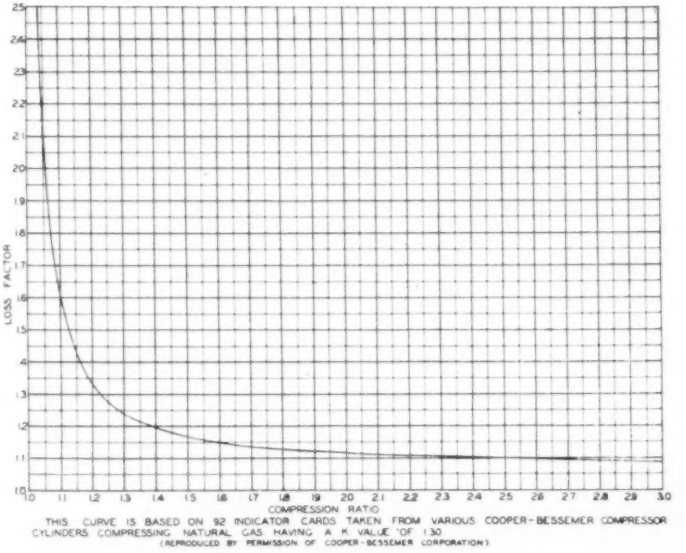

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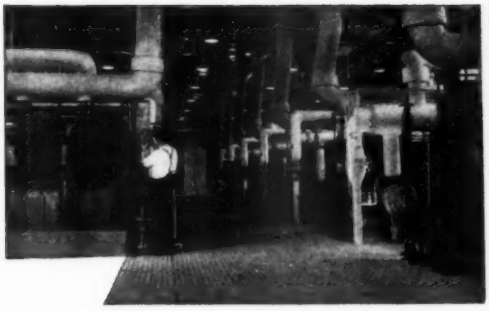
Fig. 3—Loss-factor curve



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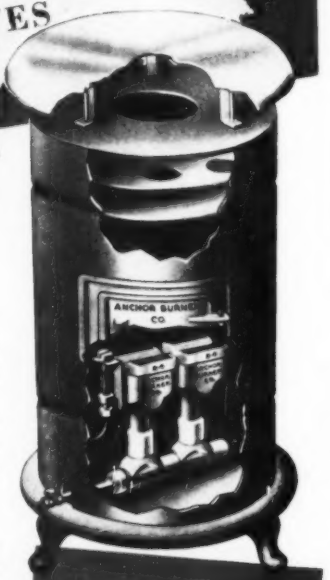

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are small and show the relative unimportance of using an exact value of n in calculating theoretical horsepower.

The value of n also affects the compressor capacity because it affects the value of the volumetric efficiency (E_v). Table 6 gives the percentage difference between the value of E_v calculated by Equation 19 using an n of 1.4 and an n of 1.3. These differences would be much smaller if a more reasonable difference in values of n were used instead of a difference of 0.10.

Calculation of Brake Horsepower

As the nominal size of a compressor is given as the recommended maximum horsepower to be delivered by the engine to the crankshaft, it is usually necessary to calculate this quantity, the brake horsepower, after the theoretical horsepower required for the compression has been determined.

The equation for B.HP. is given as follows:

$$\text{B.HP.} = \frac{\text{(T.HP.) (L.F.)}}{E_m} \qquad (20)$$

where L.F. = Loss factor
E_m = Mechanical efficiency.

Fig. 2 represents an actual compressor indicator card, and shows the "productive area" which extends from P_1 to P_2, and which can be calculated closely using Equation 16. The compressor efficiency (E) is the ratio of this "productive area" to the total area of the card, and the compressor Loss Factor (L.F.) is the reciprocal of E . The mechanical efficiency (E_m) of compressors driven by angle gas engines is assumed to be 95 per cent even though it has not been measured, because this is the value determined for horizontal compressors by actual tests.

Fig. 3 gives values of L.F. for various compressibility ratios when compressing a natural gas having a K of 1.30 at atmospheric pressure. It was prepared recently and reproduced by permission of Cooper-Bessemer Corp.

The brake horsepower required per M.M.S.C.F.D. in Problems 1 and 2 is calculated as follows substituting the value of T.HP. per M.M.S.C.F.D. by using the proposed method and the value of L.F. obtained from Fig. 3 in Equation 20.

(1) Problem 1

$$\text{B.HP. per M.M.S.C.F.D.} = \frac{(-19.40)\ (1.152)}{0.95} = -23.5$$

(2) Problem 2

$$\text{B.HP. per M.M.S.C.F.D.} = \frac{(-71.65)\ (1.090)}{0.95} = -82.2$$

LIST OF SYMBOLS USED

1. Capital Letters

A = Equivalent to $T/Z\ (\partial Z/\partial T)_p$
B = Constant
B.HP. = Brake horsepower
C = Molal heat capacity
E = Energy content per mole
E_c = Compressor efficiency
E_m = Mechanical efficiency of compressor
E_v = Volumetric efficiency of compressor
K = Ratio of C_p to C_v
L.F. = Loss Factor
P = Absolute pressure
R = Gas constant
T = Absolute temperature
T.HP. = Theoretical horsepower
V = Total volume
V_1 = Intake volume of compressor measured at inlet conditions
V_D = Piston displacement volume of compressor
W = Work involved in isentropic compression
Z = Compressibility factor, equivalent to (Pv/RT)

2. Lower Case Letters

c = Clearance of compressor
n = Equivalent to $\frac{K + A}{1 + A}$

3. Subscripts*

c = Critical property
F,G,H, J,L,S = Points on indicator card, Fig. 1
o = Condition at which gas is measured
m = Mean value
p = Constant pressure
r = Reduced property
v = Constant volume
1 = Inlet condition of gas at compressor
2 = Outlet condition of gas at compressor

*Note—There are five exceptions to this list of subscripts:

(1) E_c is the compressor efficiency.
(2) E_m is the mechanical efficiency of a compressor.
(3) E_v is the volumetric efficiency of a compressor.
(4) V_1 is the intake volume of a compressor measured at inlet conditions.
(5) V_D is the piston displacement volume of a compressor.

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The Roughness Problem

(Continued from page 95)

obtainable; a probable variation of λ within about ±5 per cent, and for commercial steel and wrought iron piping, a variation within about ±10 per cent. But in the transition of rough-pipe regions, we lack the primary and obvious essential, a technique for measuring the roughness of a pipe mechanically." In a subsequent paper he stated that: "It may be added that there are also shortcomings in the basic theories, such as the discontinuity in the velocity distribution curve at the pipe axis, and the unsatisfactory assumption as to the variation of 'mixing length' based on the Prandtl approximation. In spite of these imperfections, the resulting function have been found to be in satisfactory agreement with experiment; and the Colebrook transition function shows good agreement with the behavior of commercial piping."

Recapitulation

Summarizing the results of the foregoing analyses, the flow coefficient $\alpha = (8/\lambda)^{1/2}$ and, therefore, the friction factor λ for a pipe line to be designed for a specified pressure drop, while handling either a liquid or a gas of given physical characteristics, may then be estimated in accordance with the following expressions:

1. Streamline flow

Independent of wall roughness and:

$$\lambda = 64/N_R, \text{ or } \alpha = N^*/8$$

2. Turbulent flow

(a) **Smooth pipe** and for commercial steel pipe at small Reynolds numbers where λ or α are the same as for smooth pipes:

$$\alpha = 5.656 \log_{10} N^* + 0.294 \qquad (33)$$

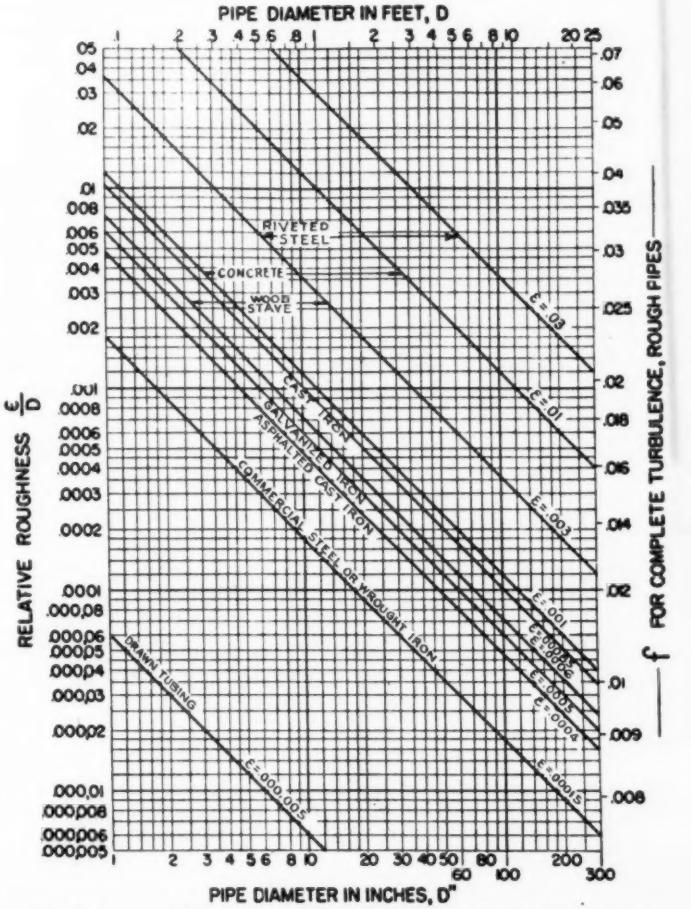

Fig. 17—Recommended values of e/D for circular pipes, after Prof. F. D. Moody, Trans. A.S.M.E.

(b) **Transition Region for Commercial Steel Pipe** (Colebrook):

$$\alpha = 5.656 \log_{10} \left(\frac{3.77}{\frac{e}{D} + \frac{3.278}{N^*}} \right) \quad (39)$$

(c) **Wholly rough flow:**

$$\log_{10} (e\,N^*/D) > 1.83$$

$$\alpha = 5.656 \log_{10} \left(\frac{3.77}{e/D} \right) \quad (38)$$

The charts in Figs. 2 and 3 *(see first article in series, issue of October 6, page 189)* have been constructed to conform with the above equations, and for a relative roughness corresponding to e = 0.0018 in.

Recommended relative roughness factors for commercial pipes of material other than steel are given by Prof. F. L. Moody* as shown in Fig. 17.

The great question now remains, however, of just how well the friction factors predicated on the equations in this paper agree with test results from actual operating pipe lines. In some measure, the answer to that question may, perhaps, be indicated by a final example based on test results reported for the 30-in. section of a natural-gas pipe line from Texas and New Mexico to California. At the observed flow rates, the flow regime in this pipe line corresponds to a Reynolds number N_R = 6,400,000, i.e., at a state of turbulence which is sufficiently high to cause a marked deviation from the smooth pipe law and thus to serve as a representative test case for comparing actual results with computed data.

The section of pipe line under consideration in this example rises from Blythe compressor station, elevation 272 ft., to Shaver Summit at elevation 1,650 ft., 65.44 miles away. The data in the Mosteller† report for this section of line were as follows:

P_1 = 785 psia.
P_2 = 682 psia.
d = 29.31 in., i.d.
L = 65.44 miles, length of line
z = 1,378 ft., difference in elevation
σ = 0.66 specific gravity, air = 1.0
μ_R = 0.0000068 Rheyns (lb./sec. ft. abs.)

T_f = 515° R. flowing temperature
T_s = 520° R. standard temperature
P_s = 14.73 psia., standard pressure
Z_m = 0.866 deviation factor at P_m = 735 psia. and T_f = 515° R.

For a compressible fluid, the F.V. Reynolds number N* takes the following form:

$$N^* = \frac{1}{76.3\,\mu_R} \sqrt{\frac{d\,\sigma\,(P_1^2 - P_2^2)}{Z_m\,T_f\,L}}$$

expressed in practical units. However, in this form it represents N* correctly only for a level line. When there is a positive static head to be overcome, as is the case in the present example, it must be modified so as to read:

$$N^* = \frac{1}{76.3\,\mu_R} \sqrt{\frac{d^5\,\sigma}{Z_m\,T_f\,L} \left(P_1^2 - P_2^2 - \frac{\sigma}{25.6\,Z_m\,T_f} \int_{z_1}^{z_2} P^2\,dz \right)}$$

and the absolute viscosity term μ_R must represent the gas viscosity under flowing conditions, i.e., P_m = 735 psia., and T_f = 515° R. According to Sage and Lacey,‡ this value μ_R may be estimated at μ_R = 0.0000136 Rheyns.

The value of the integral is difficult to ascertain unless the simplifying assumption is made that the pressure gradient between P_1 and P_2 is a straight line. The effect of this simplification on the value of N* is negligible. Then, if we let:

$$a = \frac{P_1 - P_2}{L} \text{ and}$$

$$\sin\theta = \frac{z}{5{,}280\,L} \text{ we get}$$

$$P = P_1 - \frac{az}{5{,}280 \sin\theta} \text{ and}$$

$$P^2 = P_1^2 - \frac{2az\,P_1}{5{,}280 \sin\theta} + \left(\frac{az}{5{,}280 \sin\theta} \right)^2$$

and calling $z_2 - z_1 = z$ we get

$$\int_{z_1}^{z_2} P^2\,dz = P_1^2 z - \frac{a\,P_1\,z^2}{5{,}280 \sin\theta} + \frac{1}{3} \left(\frac{a}{5{,}280 \sin\theta} \right)^2 z^3, \text{ and}$$

$$\int_{z_1}^{z_2} P^2\,dz = 741{,}925{,}000$$

Introducing this value into the expression for N* as given above, we obtain:

$N^* = 964\,(62{,}600)^{1/2} = 241{,}200$ and

$\alpha = 26.67$

Checking the chart value against Equation 39:

$$\alpha = 5.656 \log_{10} \left(\frac{3.77}{0.0018/29.31 + 3.278/241{,}200} \right) = 26.6$$

Now, introducing α in the flow equation for a line with an inclination toward the horizontal as shown in Fig. 18:

$$Q_s = \frac{1.1415\,\alpha\,d^{5/2}\,T_s}{P_s\,(\sigma\,T_f)^{1/2}} \sqrt{\frac{P_1^2 - e^s\,P_2^2}{Z_m\,L} \left(\frac{s}{e^s - 1} \right)}, \text{ in which}$$

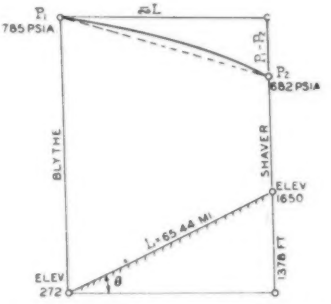

Fig. 18—Gradient from Blythe to Shaver

$$s = \frac{2\,\sigma\,z}{53.3\,Z_m T_f} = \frac{2 \times 0.66 \times 1{,}378}{53.3 \times 0.866 \times 515}$$

s = 0.0765 and

e^s = 1.0795

$d^{5/2}$ = 4,650 Hence:

$$Q_s = \frac{1.1415 \times 26.67 \times 4{,}650 \times 520}{14.73 \times 18.45} \sqrt{\frac{(616{,}225 - 502{,}101)}{0.866 \times 65.44} \times \frac{0.0765}{0.0795}}$$

Q_s = 271,000 $\sqrt{1939}$ = 11,940,000 cu. ft./hr. (97.4 per cent)

By test Q_s = 12,264,000 cu. ft./hr. (100.0 per cent)

If consideration is given to the fact that the absolute viscosity of the gas μ_R at the average line pressure P_m had to be estimated from a generalized chart and, furthermore, that the measured flow capacity is in itself a derived quantity based on orifice meter calculations, the verification of the test result by calculations based on α may be regarded as quite satisfactory.

*Prof. F. L. Moody, "Friction Factors for Pipe Flow," Trans. A.S.M.E., Vol. 66, 1944.

†W. C. Mosteller, "Flow Efficiency of a 30-In. O.D. Natural Gas Transmission Line," The Oil & Gas Journal, 7-7-49.

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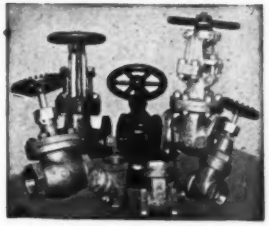

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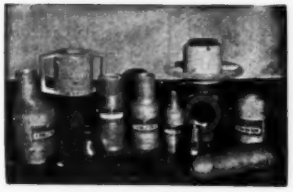

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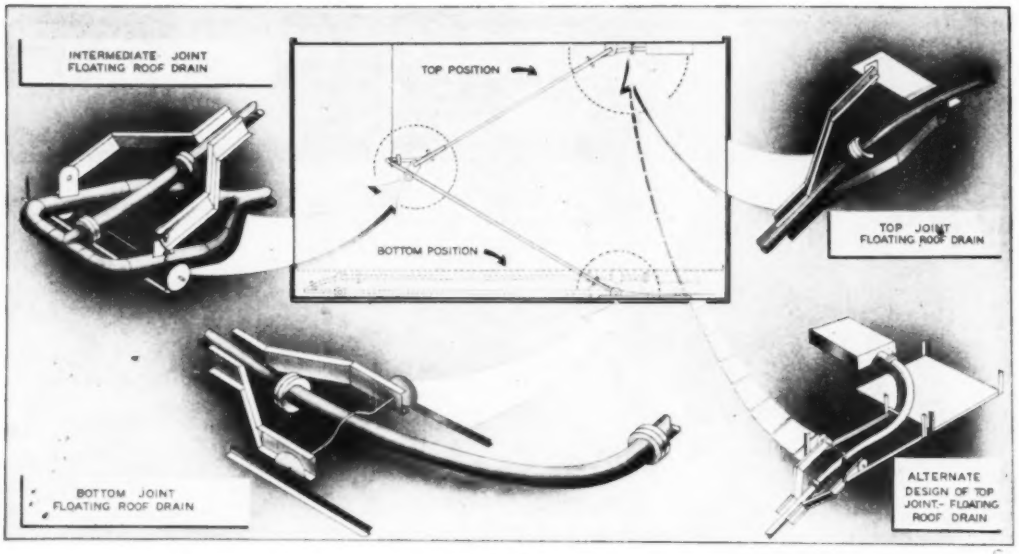


Fig. 1—Arrangement of drain line and types of joints installed in maintenance of older-type floating-roof tanks

New-Type Drain Installed on Shell's Floating-Roof Tanks

Ingenious arrangement gives trouble-free service

by M. W. Gable*

ROOF drains have always presented a maintenance problem on floating-roof tanks and failure of drains has caused operational difficulties. Our older drains are fabricated from steel pipe and swing joints. Swing joints depend on close adjustment for satisfactory operation. If too loose they leak, and if too tight they bind and cause the long lengths of pipe to buckle and collapse. Testing is not too reliable because the test must be applied by internal pressure; while in service, the pressure is external.

Long lengths of hose have been used for this purpose. At the Houston refinery, the use of hose was abandoned after trial installations failed either by kinking or by crushing when support legs came down on the hose. Long lengths of hose, when empty, will float to the surface and form air pockets which interfere with free drainage.

The weight of a pipe drain is considerable, this being especially true regarding 4-in.-size drains used on larger sizes of tanks. Swing joints must be designed to support this weight as well as be liquid-tight. In our opinion, an ideal joint is one in which one element provides flexibility while another independent element carries the load. Joints having such characteristics were incorporated into a new type drain line installed in one of our storage tanks. In this installation the load is carried on loose-fitting mechanical joints and the flexibility is obtained by use of short lengths of hose inserted in the line.

Fig. 1 shows the assembly with the roof at the highest and lowest positions and the three joints individually. The bottom joint is shown in its approximate position when the roof is in its highest, intermediate, and lowest positions. This section of hose takes care of angular flexibility as well as lateral movement at the end of the line and, therefore, replaces two swing joints normally used in pipe drains. Pipe drains used in the past required four joints to effect the same results obtained with three pieces of hose in the drain under discussion.

Loose fits are employed at all mechanical joints and the lower pipe member is supported on wheels when it rests on the floor. Therefore, very little friction is encountered when the drain line is moving. The sections of hose inserted in the line for flexibility are required to support only their own weight. Reverse flow is encountered at the intermediate joint and in order to reduce friction loss in the line the flow is split at this point.

Providing Lateral Movement

In practically all cases where drain lines are made up of pipe sections, it is necessary to provide for lateral movement at either the top or bottom connections. In our installation this movement is provided in the lower joint by travel of the hose back and forth on the floor. In tanks where heavy deposits of tank bottoms might interfere with the free movement of the hose or for other reasons, it might be desirable to fix the drain line to the floor at the lower end and provide means of lateral travel at the upper end. Fig. 1 shows an alternate arrangement that could be used. The upper end of the pipe could move back and forth on angle-iron rails. The hose would rest on a platform suspended under the roof.

The drain line installed in our tank has been in service 4 months. The tank is emptied and filled several times per month and, to date, no trouble has been experienced with the drain.

*Shell Oil Co., Inc

When Do We Need a Synthetic-Fuel Industry?

(Continued from page 88)

barrels have already been produced.

So far, our estimates show that during the next decade, future domestic production will begin to fall short of meeting our growing requirements (see Fig. 6). It will be noted that American oil production will reach a maximum rate of 7,100,000 bbl. a day by 1958. It will drop to a rate of about 6,000,000 bbl. in 1965, then taper off to 4,700,000 bbl. a day by 1975. This illustration shows graphically how the gap between domestic supply and demand grows as times goes on.

A large part of these deficits can be filled by imports from the Western Hemisphere. To estimate how large these imports will be, we analyzed the supply and demand for Canada, Central, and South America, using techniques similar to those employed for the United States. These areas will continue to produce more crude than they will use, and we can assume that their growing surpluses can be exported to the United States (Fig. 5). Consequently, we estimate that the United States can increase its imports from the rest of this hemisphere from about 500,000 bbl. a day in 1950 to 830,000 bbl. in 1960 and 2,900,000 bbl. in 1975. Thus, domestic production plus these imports can supply all of our demands for oil for at least another 10 years.

A small import of crude is now coming from the Eastern Hemisphere and is also indicated in Fig. 5. Oil from the Middle East will probably continue at this low level through 1960. After that time, all demands which cannot be filled by domestic and Western Hemisphere production could be supplied indefinitely from the Eastern Hemisphere.

In the interests of national or hemispheric security, the Government may limit imports from that zone. Such a limit is assumed to be approximately 250,000 bbl. a day, a quantity which represents a relatively small fraction of the national supply. In the event that these small imports were suddenly cut off, the economy of this country would not be seriously injured. A minor curtailment of civilian consumption could easily offset this loss.

Needs Filled Until 1961

When imports from the Eastern Hemisphere are combined with all other supplies, it will be noted that all needs for oil are filled until 1961, but after that time a growing gap between supply and demand becomes evident (Fig. 5). By 1965 that deficit will be 420,000 bbl. a day and will increase to 1,260,000 bbl. by 1975. On the basis of these forecasts, it now seems plain that the nation has at least until 1961 before it needs to turn to coal and oil shale to supply any of our liquid-fuel demands. There is nothing, therefore, to indicate that we should begin the construction of synthetic-fuel plants immediately.

The foregoing discussions cover only the normal peacetime side of the supply problem. However, the possibility of some national emergency between now and 1961 should also be considered. Estimates of wartime petroleum needs differ widely. But even if demands reach the highest estimates that have been publicized, the demands of the armed services can be met in whole or in large part by curtailing civilian uses. This is particularly true if our peacetime petroleum economy continues to grow, as all signs indicate that it will. The enlarge producing and refining capacities necessary to meet these growing needs will automatically create a larger supply pool from which emergency stocks could be diverted.

If a national emergency would prove to be so acute that we could not supply military needs through rationing, these stocks could then be supplied by at least three other methods: (1) additional capacity in producing and transportation as well as refining facilities; (2) stockpiles of critical products, such as alkylate or toluene; or (3) synthetic-fuel plants.

Canadian Oil

Recent discoveries in Canada and curtailed production in this country indicate that it should be possible to maintain excess crude producing capacity, at least for the immediate future. Similar excess capacity served us well in the last war. Additional refining capacity would call for a heavy investment, but this would cost less than would synthetic-fuel plants. The technology of refining has reached such an advanced state of development that refineries would not be outdated in a 5 or 10-year period. In contrast, the technology of synthesis from coal and shale is in such an early stage of development that synthetic-fuel plants would rapidly become obsolete.

Obviously, the nation has much to gain if we are not forced to freeze our designs as long as development is at its present immature level. Work is now going forward on many improvements in design of coal synthesis plants. If research can perfect only those improvements which have an even chance of success, the costs of making gasoline synthetically from bituminous coal can be reduced from 22½ cents per gallon to 17 cents. This 5½-cent reduction would go a long way toward making the process competitive. In passing, it should be noted that the gap between synthetic and crude will be narrowed still further if crude prices rise gradually as we expect them to.

As long as synthetic fuels are more expensive than products from crude, there will probably be proposals to support a synthetic industry with government subsidies. Perhaps the general public does not appreciate the staggering costs involved. Our estimates indicate that investment per daily barrel of gasoline from bituminous coal would be $13,900. A daily capacity of a million barrels would cost the public almost 14 billion dollars, or about $100 for every person in the country. Even in today's multibillion-dollar budgets, this is an enormous sum. In the end, the general public would have to pay that sum through increased taxes.

New Pumping Method Tested in California

LOS ANGELES.—A new and revolutionary method of oil-well pumping is now under test in California. The device is a sonic pump. It lifts fluids by means of sound waves.

The pump has been operating on an experimental basis for some time and has undergone several phases of development. It is still considered to be in the experimental stage. The pump has been tried by Union Oil Co. and is currently being tested by Standard Oil Co. of California in the San Joaquin Valley.

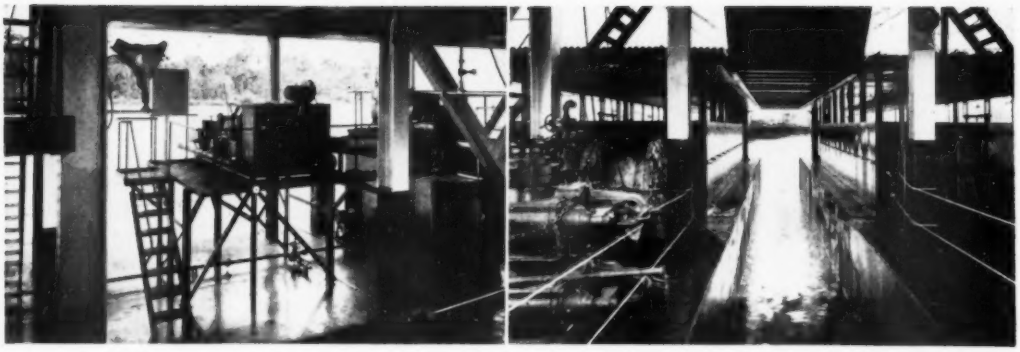
The lifting operation is performed by sound waves sent down the tubing. The source of the sound waves can be any one of a number of sinusoidal sound wave generators. On the pump tested by Union Oil the sound waves were generated by two whirling weights.

In principle, the operation is fairly simple. Sound waves are sent down the tubing at subsonic rates of around 10 cycles per second. The waves travel at the speed of sound which in oil-well tubing is 16,000 ft. per minute. Waves used are overtones of the fundamental resonant frequency.

The waves cause alternate, low-stress, expansion and contraction of tube length. The actual measured change in tubing length is very small but is sufficient to move the fluids up the pipe. Check valves placed one per length of tubing support the fliud column as it is moved upward. Early tests by Union Oil showed that gas in fluids made pumping difficult. This trouble is now largely overcome.

An important requirement for successful pumping with this sonic pump is the prevention of lateral vibrations. Vibrations of this type, if allowed to reach extreme limits, can cause damage to the tubing.

A. G. Bodine is the inventor of this sonic pump, holding U. S. Patent 2,444,4912. He is president of Soundrive, Inc., of Burbank, Calif. The company is an engineering-development firm.



Left: The shale shaker is located on the main deck. Capacities of the various mud pits are as follows: operating mud pit, 255 bbl.; settling mud pit, 215 bbl.; and reserve mud pits (two), 475 bbl. each. As can be seen in this picture, an effort has been made to provide as much clear deck space as possible. Right: This view down the drilling slot shows the ramp and pipe racks. Two fuel-oil storage tanks, holding 390 bbl. each, and the two reserve mud pits, holding 475 bbl. each, are underneath the pipe rack. At the left is the blowout preventer equipment ready for installation

Submersible Drilling Barge

(Continued from page 111)

with a total capacity of 780 bbl. of diesel oil. Adjoining the oil tanks are two reserve mud pits with a capacity of 950 bbl. The space under the drilling floor has been kept clear of all unnecessary obstructions. The only permanently installed equipment in this location is the shale shaker. A 10-ton overhead trolley is located under the drilling floor for handling blowout preventers.

The aft deck of the barge is surrounded by a 6-ft.-high watertight bulkhead which protects the machinery within this space against water spray in case of heavy seas. The major pieces of equipment located here are as follows: Two mud pumps, belt driven from the compound above; one mud-mixing pump driven by diesel engine, heat-exchanger cooled; one drilling water pump, also diesel driven; two electric-motor-driven salt-water circulating pumps; fuel-oil transfer pump; also lube-oil storage tank and butane bottle rack.

On the very aft end of the barge is the settling mud pit of 215 bbl. capacity and the operating mud pit of 255 bbl. capacity. Above the settling and operating mud pits are the dry mud and chemical houses with a total capacity of 3,500 cu. ft.

The derrick floor consists of two layers of 3-in. flooring with a layer of asphalt paper and a mopcoat of asphalt between the layers of wood flooring. Outboard of the derrick area the deck consists of checkered steel plate, and a tool room with large sliding doors has been installed on the starboard side of that region. Two 5-ton stiff-leg derricks service the pipe-racking area covering the forward portion of the barge. Above the reserve mud pits and the fuel-oil tanks a hydraulic ram furnishes the power for operating the cargo line.

At the superstructure level on the aft end of the barge are the quarters and a work room used for periodic checking of the mud and available for the various intermittent services used for checking the direction of the hole, the formations, etc. The tool pusher has a large room with private shower and toilet. There is a change room for the men working on the barge and a bunk room with eight berths. Showers and toilets are adjoining the bunk room. There is also a well-equipped office in which the ship-to-shore radio is located. A galley and mess room, equipped with a gas-burning stove and electric refrigerator, is capable of feeding the crew when required. Normally, the crews will live at home and travel to and from the barge by boat.

C. G. Glasscock signed the contract for his Unit No. 4 on February 19 of this year, and the keel was laid on May 2. The barge was launched on July 29 with the traditional christening being performed by Mrs. James C. Storm. The barge was delivered to the owners, ready to spud in, on August 12, 1949, less than 6 months after the signing of the contract.

"Rusty" Cunningham will be tool pusher for the rig on its first hole. "Woody" Chism and "Blackie" Hall will be two of the drillers. Boats will be under the supervision of Capt. Harry Corkhill. Company-owned craft include: 42-ft. crew boat, 30-ft. standby boat, and 26-ft. pusher's boat. Standby boat is equipped with mobile telephone.

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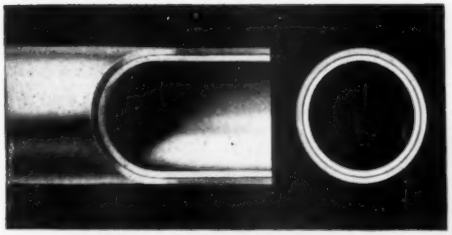

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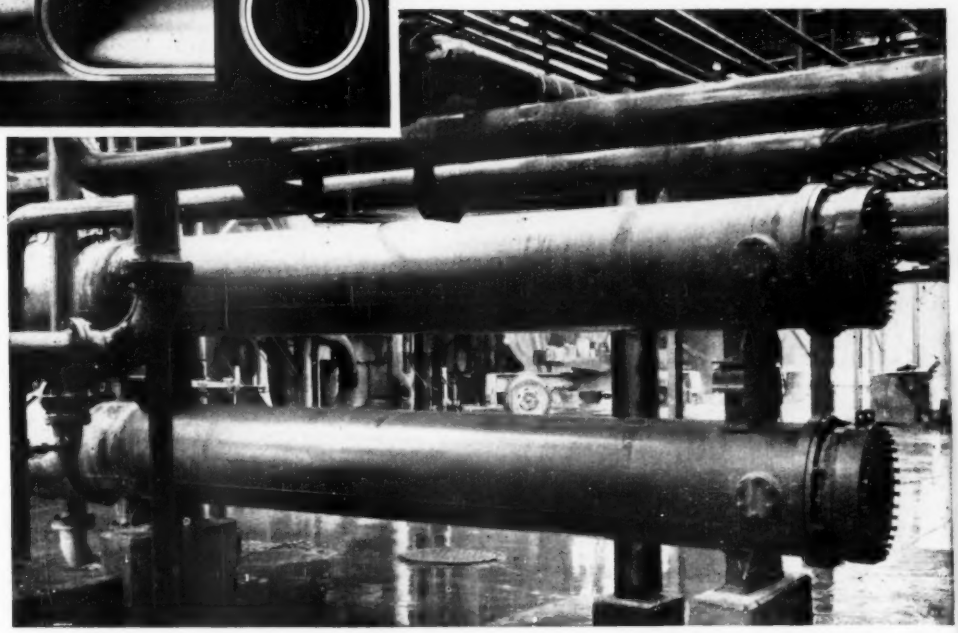

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These tubes are employed in two heat exchangers recently built by the Alco Products Division, American Locomotive Company at their Beaumont, Texas plant, to handle 134,000 lb. per hr. of ammoniacal copper acetate on the shell side and 212,000 lb. of river water per hr. through the tubes.

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Van Field Celebrates Its 20th Anniversary

(Continued from page 93)

justment faults present along the southeastern flank. To arrive at the pressure factor to be used for each lease, isobaric maps are then prepared.

In developing the Woodbine sand the practice was to set 7-in. casing on top of the pay and then to drill to about minus 2,450 ft. (or 50 ft. above the oil-water contact) where a perforated liner was set. With the introduction of electrical well logging, gun-perforating and improved cementing practices, Pure Oil Co., immediately after the war, embarked upon a program of recompleting all Dexter or brown sand wells to insure more complete exhaustion of each individual sand member of the Woodbine formation.

This work consists of cutting out the 5½-in. perforated liners, cleaning out the pay section, and then running an electrical log of the Woodbine. Blank liners are then run, cemented back up into the 7-in. casing, and selectively gun-perforated in the oil zone from information gained from the electrical logs. The few wells then making water were worked on first and when these were finished, one-location moves were made up one row of derricks and down the next. To date about 175 wells have been worked over and it is expected that at least another year will be required to complete the program if only one rig is used as is currently the case. From 5 to 7 days are now required per well.

Salt water was first encountered along the east edge of the field while delineating the productive limits. Due to the low permeability of the bentonitic pay, wells producing from this section on the flanks make only a small volume of water daily; serious water encroachment in these wells is never expected. Controlled withdrawals from the highly permeable brown sand wells, and their uniform completion 50 ft. or more above the water level, have minimized the appearance of water in those wells. Only in unusual cases, where perhaps a well is bottomed in or near one of the radial faults, has any producer made any appreciable amount of water.

To handle such brine as might be produced by wells in the unit and those outside, Van Salt Water Disposal Co. was organized, and in 1933 a salt-water gathering system consisting of transite and tile pipe was installed. All salt water from lease gun-barrel tanks gravitates to four intermediate stations, each capable of storing 20,000 bbl.

Beginning in November 1944, following the completion of two treating plants and the drilling of nearby injection wells, all produced brine has been returned to the lower Woodbine. At the treating plants, which are similar to those in nearby East Texas field, the brine is aerated, treated with chlorine, lime, and alum, and then run through a vertical sand-packed filter. The pH of the treated water is controlled to about 7.5.

From the filters the water is pumped to two disposal wells, one about one-half mile outside the eastern limit and the second the same distance from the southern limit of oil production. Little difficulty is had in injecting the water to the Woodbine sand, both wells handling the daily injection volumes under vacuum or low pressure. Because the workover program has naturally reduced water production, the two treating plants likewise are operating at much less than rated capacity

Due to the low fluid volumes handled and their shallow depth, wells producing from the bentonitic section are largely pumped by central powers As previously stated these are concentrated on the flanks where the more permeable upper section (brown sand) is below water level. Of the 297 pumping wells in the field, 207 are pumped in this manner. Majority of the powers consist of 30-ft. bandwheels driven by 150-hp. gas engines

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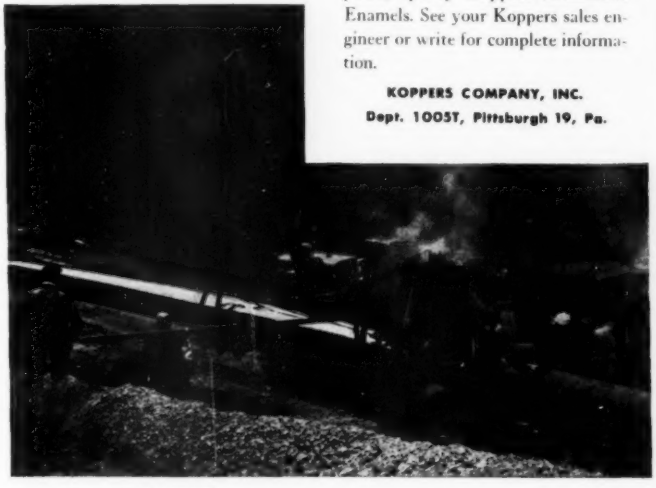

KOPPERS BITUMASTIC ENAMELS

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Computing Tower Temperatures

In making heat balances of fractionating towers how are the plate temperatures determined?—G. L. F.

In a most general way the temperatures of the liquids in a tower are related to their bubble points, and the vapor or overhead product temperature is related to the dew point of the overhead product. The following developments or methods have appeared:

No. 1.—Historically, the method used in 1928-1930 and perhaps earlier, was simply to use the 20 per cent point on the A.S.T.M. distillation curve for liquid temperatures (bottoms or side-draw materials) and the 80 per cent A.S.T.M. distillation temperature as the top (or vapor) temperature. This usage had some theoretical basis because at atmospheric pressure the bubble point is about equal to the A.S.T.M. 20 per cent point and the dew point is somewhat related to the 80 per cent point (actually nearer 65-75 per cent). Stated in another way, the zero percentage vaporized temperature on the equilibrium flash vaporization curve is about the same as the 20 per cent temperature of an A.S.T.M. distillation, and the 100 per cent vaporized point on the flash vaporization curve is about the same as the 80 per cent A.S.T.M. point.

No. 2.—Although such temperatures could be moved up or down to account for the pressure within the tower, there was no way to account for the partial pressure effect of the stream or of lighter vapors that passed the liquid draw plate without condensing. Accordingly, the author of this page devised in 1932 a method of correcting the zero or 100 per cent points on the flash-vaporization curve for steam or other partial pressure effects. This necessitates the computation of a heat balance at the plate being considered so that the amount of reflux can be computed. The reflux constitutes a large part of the material present at the plate and it therefore has a pronounced effect on the partial pressure of the vapors at the plate. By a study of commercial operations it was found that the vapors whose boiling range was close to the boiling range of the material condensed were not effective in reducing the partial pressure. Accordingly, the vapors of the next lower-boiling product are considered as being ineffective as partial pressure reducers and they are, therefore, left out of the computation of partial pressure. A complete description of the method, with illustrations, is given on pages 417-422 of the third edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., New York, 1949).

No. 3.—In 1933 there appeared in Perry's Chemical Engineers Handbook (second edition, page 1460, McGraw-Hill Book Co., New York, 1941) a method similar to No. 1 above. It is suggested that the top temperature is the same as the 75 per cent temperature of an A.S.T.M. distillation but it should be corrected for the pressure in the tower and for the partial pressure effect of light gases. Likewise, the 10 per cent A.S.T.M. temperature corrected for pressure and steam is used for kerosine draw plates, and the 5 per cent A.S.T.M. temperature corrected for pressure and steam for gas oil or heavy-oil draw plates. For very high boiling materials an A.S.T.M. is conducted at the low pressure of the proposed tower installation.

No. 4.—In 1941, J. W. Packie disclosed the method used by the Standard Oil Development Co. (Distillation Equipment in the Oil Refining Industry, A.I.Ch.E., Vol. 37, p. 41). With respect to the top temperature it is the same as Method 2 above. With respect to sidestream temperatures, the zero per cent point on the flash-vaporization curve is corrected for partial pressure effects and then an empirical correlation based on plant experience is used to greatly reduce the computed temperature. The method is quite laborious because vapor temperatures on the plate below the draw plate, vapor temperatures on the draw plate, and an empirical relationship must be used.

No. 5.—Theoretically, a plate temperature (top, side draw, or bottom) should be based on the entire material that is present at the plate, i.e., product, reflux, steam, and any products lighter than the one under consideration. Part of this mixture will be condensed into reflux (and side product, if any) and part will proceed past the tray as a vapor. Thus, the temperature on flash-vaporization curve which represents this partition into condensate and vapor, will be the plate temperature. It should, of course, be corrected for pressure and for the partial-pressure effect of any materials not included in the mixture, i.e., steam and inert gas.

Glenn S. Stenman studied this method during graduate work at University of Tulsa. Difficulty was encountered in drawing the flash-vaporization curve of the mixture on the plate and it was concluded that the method could not be explored until better methods of drawing or estimating flash-vaporization curves became available. It had been hoped that the effectiveness with respect to partial pressure reduction of each type of vapor that passed the plate could be determined. In other words, to determine if gasoline (or gas or steam) has a greater partial-pressure effect on gas oil than does kerosine or naphtha. None of the methods of drawing flash-vaporization curves gave sensible results, most methods indicating partial-pressure effects greater than possible by Dalton's Law of Partial Pressures.

Solubility of Carbon Dioxide in Gasoline

Have you information on the solubility of carbon dioxide in gasoline? The temperature will be about 50° F., and the pressure 40 psig.—G. J. Z.

Although no data are directly available on the solubility of carbon dioxide in gasoline, meager information on propane, butane, pentane, benzene, cyclohexane, hexadecane, and decahydronaphthalene shows that carbon dioxide is surprisingly soluble. McCay, Seely, and Gardner, "Distribution of Gaseous Solutes Between Aqueous and Liquid Hydrocarbon Phases," Ind. Eng. Chem., 41, 1377 (1949) indicate the following approximate (read from a small chart) solubilities for 104° F. (40° C.) and 55 psia.:

	G. CO_2 per G. hydrocarbon
In pentane	0.07
Hexadecane	0.04
Cyclohexane	0.025
Benzene	0.015

Poettman and Katz, "Phase Behavior of Binary Carbon Dioxide-Paraffin Systems," Ind. Eng. Chem., 37, 847 (1945), and "Carbon Dioxide in a Natural Gas-Condensate System," Ind. Eng. Chem., 38, 530 (1946), show equilibrium phase diagrams complete to the critical condition for mixtures of carbon dioxide and propane, butane and pentane. They also show the following equilibrium constants for carbon dioxide when in contact with a distillate-well fluid having material in it that boils up to 600° F. (as well as normally gaseous hydrocarbons):

Temp. °F.	Pressure psia.	K Equi. Constant*
50	55	16.3
100	55	29.0
104	55	30.0

*Approximate.

The two sources do not agree well at all—the Poettman data giving about one-fourth the solubility indicated by the Gardner data.

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For years Shand & Jurs has furnished the major refineries of the world with safety, conservation and measuring devices for crude and refined petroleum storage tanks. The research and the designs of S. & J. engineers always parallel developments in the petroleum industry, so it is only natural that the expansion in the manufacture and distribution of Liquefied Petroleum Gases should be accompanied by a complete line of S. & J. tank fittings specifically designed for the characteristics of these gases. Shand & Jurs fittings cover the entire range from large refinery spheres to bulk stations and delivery truck tanks. If you are refining or marketing L.P. gases, we have the fittings you will want. Your inquiries are invited.

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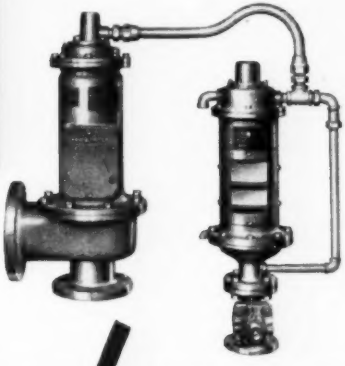
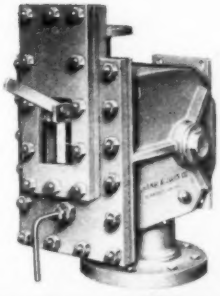
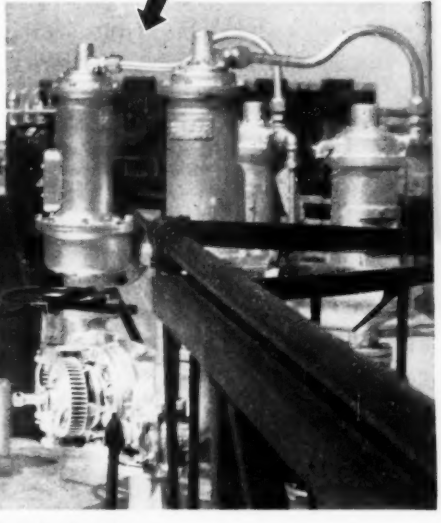
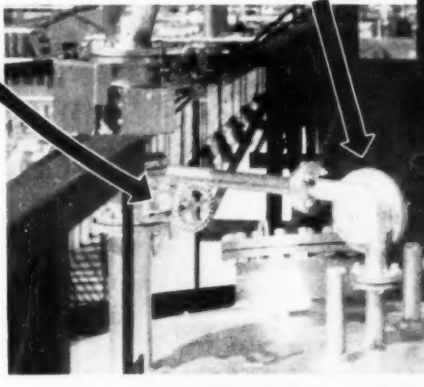


This is the S. & J. Automatic Tank Gauge Model ST-400 designed for high pressure spheres and cylindrical tanks. This gauge is of the ground reading type. We also manufacture other gauges which are read at the tank top.





This is the S. & J. model ST-5265 High Pressure Tape Block Valve, designed for locations where it is desirable to close a valve on a flat tape. These valves permit isolation of gauge heads from tank pressure and vapors, important factors in maintenance, inspection and repairing.



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B-L furnace enclosures lower maintenance costs

● Unit-suspended walls and arches not only provide top operating efficiency, but lower maintenance costs as well. Here's how:

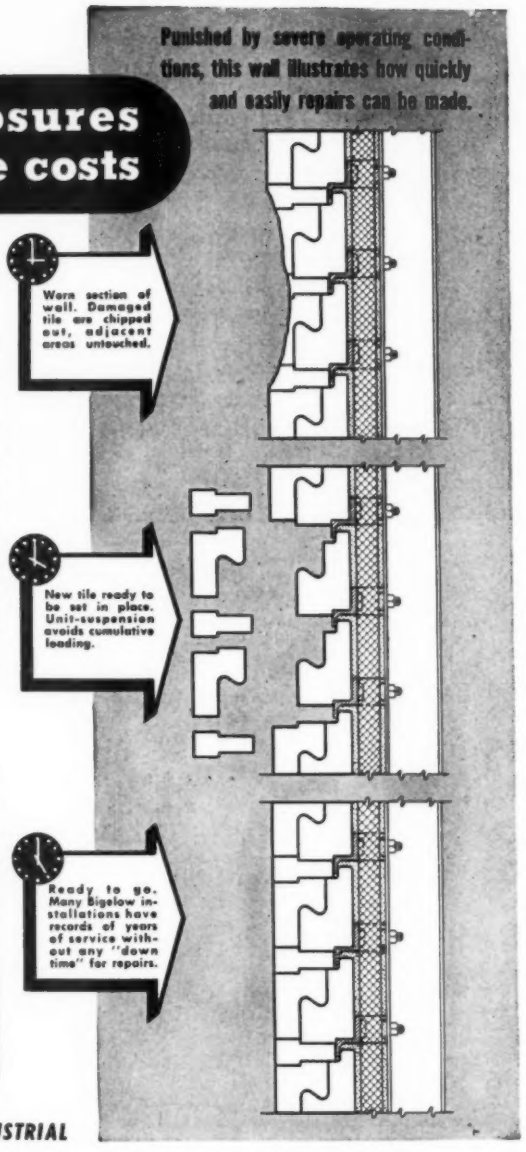
By cutting the *size* of the repair job. *Unit* repairs are possible; only worn tile need be replaced, other areas—above, below, at the sides—are untouched. Result: less handling, less labor, less tile replacement.

By reducing the *time* spent for repairs. Installation "outage" changed from days to hours. Furnaces get back on the line—*fast*. In the pictures at the right, punishing operating conditions have induced wearing on the Bigelow double wall. After cooling, *only* the worn tile have been removed; adjacent areas remain as sturdy as before. In the third picture, the repaired wall is just like new.

Unit-suspension avoids loading tile on top of tile and resulting cumulative stresses and strains. Mechanical spalling caused by pinching, buckling and other thermal movements is eliminated.

Specify Bigelow-Liptak suspended furnace enclosures for all kinds of heat installations—boiler settings, oil heaters, vessel linings, driers, kilns, metallurgical furnaces.

Punished by severe operating conditions, this wall illustrates how quickly and easily repairs can be made.


Worn section of wall. Damaged tile are chipped out, adjacent areas untouched.
New tile ready to be set in place. Unit-suspension avoids cumulative loading.
Ready to go. Many Bigelow installations have records of years of service without any "down time" for repairs.

Capsule comments to complete our story:

1. Walls and arches feature "built in" stability; any portion can be removed for replacement without weakening adjacent areas. Design provides for thermal expansion.
2. Construction is air tight; heat losses are reduced. Maximum efficiency can be maintained and fuel used to full advantage.
3. Unit suspension permits flexible design, eliminates cumulative loading.
4. B-L engineers co-ordinate enclosure requirements with problems of temperatures, types of firing equipment, and slagging and erosion possibilities.

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DIESEL FUELS—

The Present and Future

by W. G. Ainsley*

In his Western Petroleum Refiners Association paper given at the recent Lansing, Mich., "Diesel Fuels" clinic, the author sketched briefly some of the factors in the past history of this subject. The text for his coverage of the present and future is given below.

For news article on the other W.P.-R.A.-Diesel Fuels Clinic papers, see the Journal's August 25 issue, page 82.

AT the present time—with the demand for high-octane-number gasoline, both aviation and motor—we have on hand in the refineries straightrun, thermal cracked, and catalytic cracked products in the diesel-fuel range. Table 1 gives the physical tests on such products from a refinery operating on Mid-Continent crude.

The problem is to balance the refinery operation, as the products must be kept moving. It may appear that a refinery has a great deal of tankage for storage of products, but let any one cut fail to move, and it is not long until the crude run must be decreased.

These catalytic cracked stocks are the new products to be considered. Some discussers of the subject of diesel fuels have left the impression that catalytic cracked stocks are all bad (see Table 1 for characteristics of such stocks). The gravity is lower than for straightrun stocks, but this means higher B.t.u. per gallon. Distillation, viscosity, cloud, and pour are the same as normal straightrun fuels. It may be worth while to investigate ways to burn such fuel so as to utilize the higher B.t.u. value of this fuel.

It is not necessary to use products such as the cat cracked material as it comes from the stills, but it would be well to consider blending some of this product into diesel fuel.

It may be noted that the sulfur is higher on the catalytic cracked stock. Also, the sulfur content of available crudes is increasing. Either the refiner must take out the sulfur, or the engine must be taught to live with it. Actually, sulfur has at least one good point: it is an excellent ignition improver. For example, 1.0 per cent by weight of flowers of sulfur added to 54-cetane-number diesel fuel increased it to 64 cetane number.

The future is not all dark—there is the Fischer-Tropsch process which shows promise, there are treating processes which may increase in general use, and there is the possibility of selective segregation and blending of stocks. All of these require additional processing and further separation of products in the distribution system, which must increase the cost of fuel delivered to the customer.

There also is the possibility of improving the cracked products by the use of additives, or by fortifying the lubricating oil. Oxidation inhibitors to protect against storage deterioration have been tried. Cetane improvers have been investigated in the laboratory, some field testing has been carried out, and some diesel fuels containing improvers have been marketed. Fig. 1 shows the effect of adding amyl nitrate to cracked stocks. Our laboratory had done considerable work on this product and it seems to have commercial possibilities.

Use of additives in the fuel to counteract the effect of sulfur seems to be in the discussion stage, but the use of additives in lubricating oil to protect against deposit effects of sulfur in the fuel has been investigated and such oils are on the market.

It might be well to follow the recommendations which have been made for the better utilization of gasoline octane numbers, i.e. using dual fuel or secondary fuel. Starting aids are now being marketed for use in diesel engines and there is every reason to believe that continuous use of a secondary fuel would give real advantage. Continued cooperation between the producers of power plants and the producers of fuels will be the answer to our problems.

*Director, engine laboratory, Sinclair Refining Co., Harvey, Ill.

DISTILLATES FROM MID-CONTINENT CRUDE

	Straightrun		Thermal cracked		Catalytic cracked	
200 c.c. distillation—	"A"	"B"	"A"	"B"	"A"	"B"
Gravity	42.1	38.8	35.6	35.9	27.9	23.8
I.b.p	347	371	390	400	448	440
10 per cent	382	431	416	424	498	488
50 per cent	435	502	432	460	544	526
90 per cent	506	595	465	522	604	582
End point	557	653	522	563	639	615
Flash, p.m.	144	170	178	174	226	222
S.S.U. at 100° F.	32	35	31	32	35	36
Cloud	—42	+12	—25	—22	10	16
Pour	—45	0	—60	—35	—5	0
Color (Saybolt)	16+	Below —16	Below —16	Below —16	Below —16	Below —16
G.m. gum	1.6	22.4	68.3	60.2	80.5	82.2
Sulfur	0.10	0.18	0.41	0.37	0.52	0.59
Cetane number	51.6	53.7	34.0	39.2	35.6	25.0
Cetane index	50.2	54.6	36.7	42.2	39.1	28.4
Conradson carbon (10 per cent B.T.M.S.	0.01	0.01	1.14	0.15	0.08	0.16
Aniline point, °F.	148.6	162.3	126.0	117.7	118.4	88.0

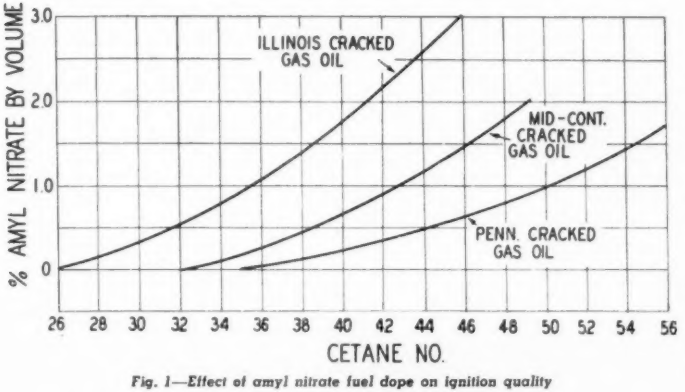


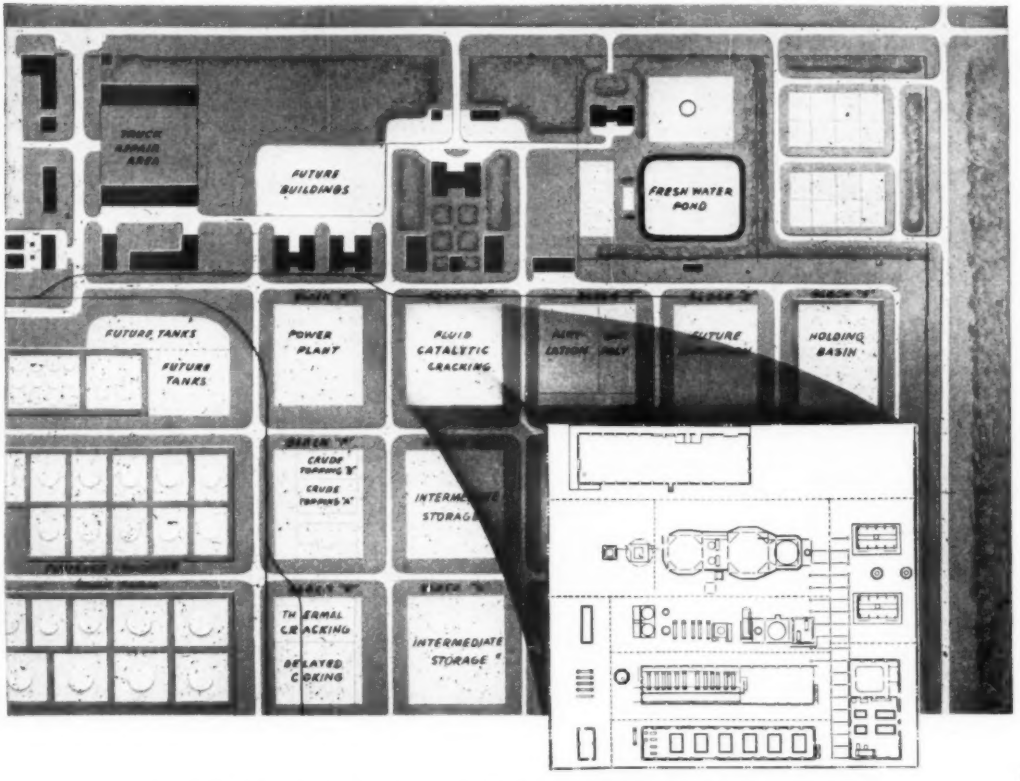
Fig. 1—Effect of amyl nitrate fuel dope on ignition quality

BOOKS

SEISMICITY OF THE EARTH AND ASSOCIATED PHENOMENA. By B. Gutenberg and C. F. Richter. Published by Princeton University Press, Princeton, N. J. 373 pp. $10.

This is an account of the relative seismicity of various parts of the earth during the limited period (since about 1904) for which sufficiently accurate data are available. Geographical and geological relations of the principal earthquake zones and areas are discussed, including correlation with mountain structures, oceanic deeps, gravity anomalies, and active volcanoes. A new check list of active volcanoes is included. The authors have also provided extensive tables giving the locations of earthquakes in geographical order and grouped according to depth, together with carefully assembled chronological lists of the larger earthquakes during the period studied.

N.B. While it is axiomatic that return on investment—the *ultimate earning* power of a refinery unit when actually on stream—is the only true evaluation of competitive engineering recommendations, initial plant costs remain a major factor in refiners' decisions on plant installations. M. W. Kellogg takes specific steps to *minimize initial plant costs* consistent with the achievement of *highest ultimate earning power.*



PLOTTING TO SAVE THOUSANDS OF HOURS

The process plan is approved. Now comes the engineering—a simple phrase but a mammoth task. Proper coordination at this point can mean thousands of engineering hours saved . . . many weeks cut off final delivery date of the completed refinery.

Kellogg solves this problem in a unique manner. *Before* design engineering is started, every project is referred to a compact engineering PLANS GROUP, composed of broadly-trained specialists in every major phase of refinery engineering. This PLANS GROUP—with the active collaboration of process, project and construction engineers—*pins down* in cooperative effort every factor that might appreciably affect the overlapping phases of the work. In short it creates a fixed yet elastic plant layout.

The PLANS GROUP plots within defined limits the location and servicing arrangements for all equipment; vessel and piping clearances; utility entrances and exits; pipeway and heat exchanger banks; and a host of other variables that, once established, permit the specialized design divisions to proceed independently in engineering their particular portions of the plant.

This intensified, cooperative effort has virtually eliminated re-engineering time. And as production engineering now proceeds simultaneously in *all* phases, on a uniform, pre-fixed basis, the average time saving on engineering has been in the neighborhood of 20%—with a corresponding advancement of completion dates.

The success of this type of operation is dependent in large measure on *the size and completeness* of Kellogg's technical man-power pool, from which key specialists can be drawn to exactly match the requirements of any problem posed . . . and on the *breadth* and depth of practical experience those men enjoy. Both are necessary to truly achieve LOW INITIAL COSTS without sacrifice of other important considerations.

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Cost-imating

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Road Building

APPROXIMATE* COST INDEXES† FOR ROADS, 1946 = 100

Year	Roadway excavation	Surfacing	Structures	Composite
1926	101	82	63	84
1928	91	75	58	77
1929	87	74	57	75
1930	83.5	66	53.5	68
1931	77	58	47.5	64
1932	54	52	41.5	49.5
1933	69	57	43	60
1934	80	68	48	67
1935	71	67	48.5	65
1936	72	67	54.5	66
1937	65	66	56	64
1938	59	61	53	59
1939	58.5	62	52	59
1940	58	60	53	58
1941	85	67	62	66
1942	104	87.5	74	89.5
1943	123	100	81	103
1944	105	91	82	93
1945	101	89	80.5	91
1946	**100**	**100**	**100**	**100**
1947	109	115	119.5	114
1948	120	128	134	127
1949 est.	115	136	139	130

*Estimated from a small figure. †Public Roads Administration Index from Engineering News Record, March 17, 1949, page 167.

TABLE 1

Approximate Costs (1946) of Miscellaneous Road Construction Items

Reinforcing steel	¢/lb.	7.5
Structural steel	¢/lb.	11.3
Structural concrete	$/cu. yd.	38.8
Excavation—common	¢/cu. yd.	0.19-0.59
rock	$/cu. yd.	0.76-3.33
Bridges (see Table 3)		
Culverts—galv. steel:		
10-in. dia.	$/ft.	0.93
15-in. dia.	$/ft.	1.28
18-in. dia.	$/ft.	1.43
24-in. dia.	$/ft.	1.93
Culverts—concrete*	$/ft.	45-60
Cleaning and grubbing	$/acre	80-140
15-ft. roadway	$/mile	150
20-ft. roadway	$/mile	200
30-ft. roadway	$/mile	300

*5-ft. span—6-ft. 6-in. height—30-ft. width.

TENTATIVE SCHEDULE OF TOPICS

No. 48—Sept. 15—Piping
No. 49—Sept. 22—Vacuum Equipment
No. 50—Sept. 29—Coil-in Box Equipment
No. 51—Oct. 6—Chemical Equipment—3
No. 52—Oct. 13—Excavation, Concrete, and Foundations
No. 53—Oct. 20—Road Building
No. 54—Oct. 27—Fire Protection and Miscellaneous
No. 55—Nov. 3—Refinery Labor
No. 56—Nov. 10—Steam Jet Ejectors

TABLE 2

Approximate 1946 Costs of Roads per Square Yard
(Clearing, excavation, etc., not included)

Kind of road base—	Type of surfacing— No surfacing	Road oil	Double asphalt	Triple asphalt
Dirt	$0.13	$0.22		
Clay sand, 6-in.	0.27	0.36	$0.60	$0.78
Clay sand, 10-in.	0.36	0.45	0.69	0.87
Gravel, 6-in.	0.45	0.55	0.78	0.96
Gravel, 10-in.	0.73	0.82	1.05	1.24
Crushed rock:				
6-in.	0.56	0.66	0.89	1.07
10-in.	0.91	1.00	1.23	1.42
Concrete, 6-in.	2.27			
Concrete, 9-in.	3.20			

TABLE 3

Approximate Costs (1946) of Simple Concrete Bridges of Various Constructions Used in Refineries*

Span, (ft.)	Dollars per sq. ft. of deck
15	5.00- 9.00
20	5.40- 9.20
25	5.70- 9.40
30	6.10- 9.70
35	6.40-10.00
40	6.70-10.20
45	7.10-10.40
50	7.50-10.70
55	7.80-11.00
60	8.10-11.30

*Reinforced concrete piers, reinforced slab and some bridges with deck girders. Average height of 15 ft.—width 30 to 44 ft.

TABLE 4

Retaining Walls—Yards of Concrete and Pounds of Steel per Linear Foot*

Height (ft.)	Cu. yd. concrete	Lb. steel per cu. yd
3	0.3	3.5
5	0.5	3.1
10	1.0	2.3
15	1.75	1.7
20	3.7	1.3

*Semigravity type designed for a maximum toe pressure of 3,000 lb. per sq. ft.

No. 53 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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PIPE LINES

Cities Service Dedicates Hugoton-Kansas City Line

THE dedication of Cities Service Gas Co.'s 405-mile, 26-in. on October 12, was made an occasion for an effective display of pipe-line construction equipment and presentation of information regarding the company's operation.

The ceremony of turning the valve for transmitting Hugoton gas to Kansas City was performed at the company's South Glavin regulator station, near Lenexa, Kans., 20 miles from Kansas City. In addition to Gov. Frank Carlson of Kansas and Gov. Roy J. Turner of Oklahoma there were mayors of 12 cities present for the event. S. B. Irelan, president, Cities Service Gas Co., Oklahoma City, served as chairman.

W. Alton Jones, president, Cities Service Co., New York, made a forceful talk for the preservation of free economy, in connection with which he cited personal experience of his early career in that area.

In discussing what had been accomplished in the development of natural-gas pipe-line techniques he pointed out that Cities Service has pioneered all-welded, high-pressure transmission lines, the application of orifice meters at city limits, and the utilization of underground storage.

The dedicated project, built in 1948 and 1949, cost $31,000,000 of which $21,500,000 was spent for pipe and the cost of laying. The line had been tested at 900 lb. before going into transmission service. The 20,800-hp. compressor station in the Hugoton field cost $4,500,000.

The new line has a capacity of 270,000,000 cu. ft. daily to augment the capacity of the previously existing system of the company, amounting to 650,000,000 cu. ft. daily.

Need for transmitting more than a billion cubic feet daily within a decade is foreseen by Cities Service because distributing companies anticipate that by 1957-58 they will need another 334,000,000 cu. ft. capacity for peak-day loads.

Following the South Glavin afternoon ceremony attended by more than

Gov. Roy J. Turner of Oklahoma, left, assists in opening gate valve at dedication ceremonies of Cities Service Gas Co.'s Hugoton-Kansas City 400-mile, 26-in. line near Lenexa, Kans., October 12. Others helping Turner open the valve are, left to right: Mayor William E. Kemp, Kansas City, Mo.; S. B. Irelan, president of Cities Service Gas Co., Oklahoma City; Gov. Frank Carlson of Kansas; and W. Alton Jones, president, Cities Service Co., New York

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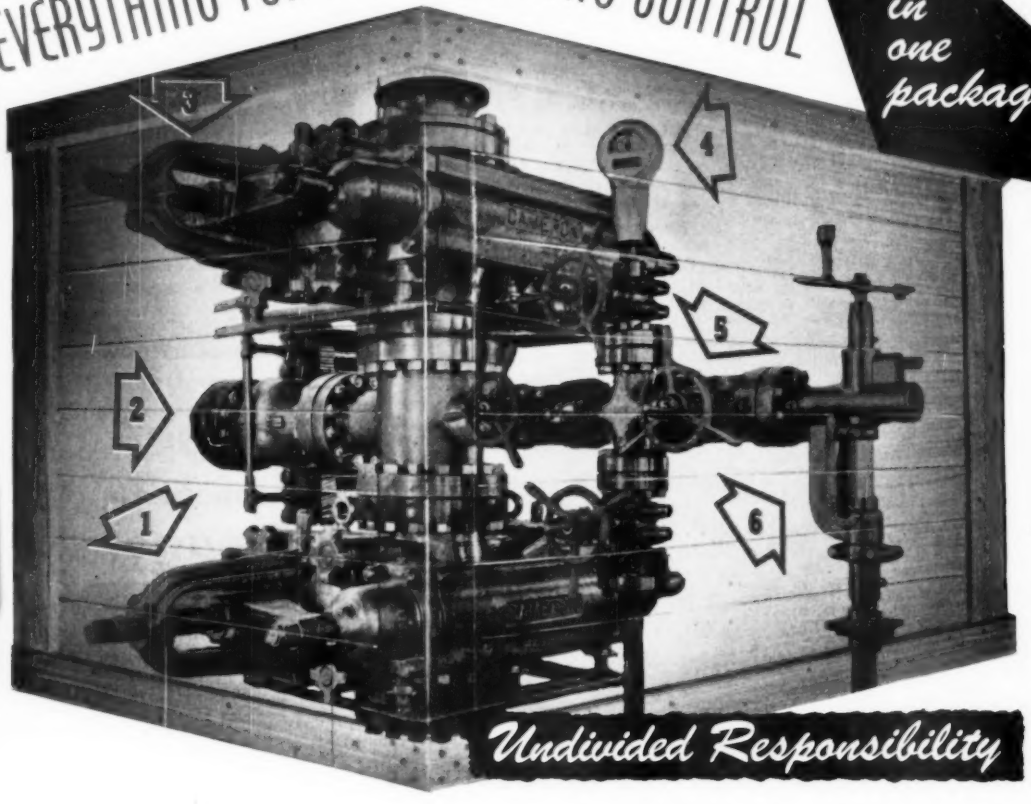

1. Cameron Type "QRC" Pressure-Operated Blowout Preventer, equipped with blind rams for well control while pipe is out of the hole.

2. Cameron Type "HCR" (High Closing Ratio) Pressure-Operated Gate Valve for well control thru the flow-line.

3. Cameron Type "QRC" Pressure-Operated Blowout Preventer, equipped with pipe rams for well control while drilling.

4. Cameron Mud Line Pressure Gauge to provide accurate and easily-read line pressures while bleeding off well pressures thru the choke manifold.

5. Cameron Flex-Seal Mud Line Valves to assure dependable operation and pressure-tight closure should it become necessary to bleed off well pressures.

6. Cameron Type "D" Flow Wing with built-in valve and specially hardened, easily replaceable, flow bean to provide the final measure of well control while bleeding off well pressures.

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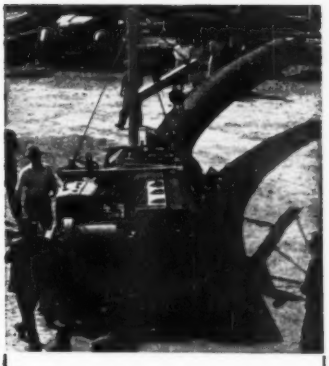

Two joints of 30" pipe welded together to form a length 62' long, shown in the final Bending Stage in the "Cinch" Bender. Note how the pipe was bent continuously through the Welded Joint. This demonstration established firmly, quality on an Economical Basis.

Makes Bending a Cinch

THE COODY BENDER CO.
P. O. Box 9271, Central Park Station
HOUSTON, TEXAS

900 people, including executives of petroleum and natural-gas pipe-line companies, contractors and suppliers, a buffet dinner for 500 guests was given at the Hotel Muehlebach, Kansas City.

El Paso, San Juan Line Proceedings to Reopen

Hearings will begin January 4 in Washington, D. C., by Federal Power Commission to receive additional evidence from El Paso Natural Gas Co. in reopened proceedings involving that firm's proposal to construct a 451-mile pipe line from the San Juan basin in New Mexico, Colorado, Utah, and Arizona, to a point near the Arizona-California border.

Pipe Laying on Large Scale in 1949

The large scale on which pipe-line construction has been conducted in the first three quarters of this year made it appear last month that 1949 operations as a whole would show a 50 per cent increase. While the current steel strike seriously hampers progress on some projects it is still likely that the total pipe laying at end of 1949 will be found to be exceptionally high in comparison with previous years.

In 1947 and 1948 pipe laying for petroleum and natural gas lines was being done at an annual rate of approximately 10,000 miles annually. Before the steel strike it looked as though 1949 operations would total 15,000 miles.

After making allowances for certain conflicting proposals, it still is apparent that more than 35,000 miles of domestic and foreign pipe line is quite definitely proposed for future construction. This estimate takes into consideration certain individual cases where more than one project has been proposed to serve an area for which only one system will be built within a reasonable time.

Projects for 1949 completed and under way in the United States total 16,040 miles of which 4,960 miles is for crude oil, 1,680 miles for products, and 14,400 miles for natural gas. Approximately 5,000 miles of petroleum and natural gas lines has been completed in 1949, and is under way in foreign countries. Data regarding projects naturally do not directly indicate the pipe laid in 1949, for some of these undertakings were under way last year and some will continue in the construction stage beyond the end of this year.

New projects are being announced from week to week and bids are being taken for new work. Recent bidding has been done in Great Lakes Pipe Line Co.'s Kansas City-Des Moines, 12-in. line and a Michigan Wisconsin Pipe Line Co. 195-mile lateral line program.

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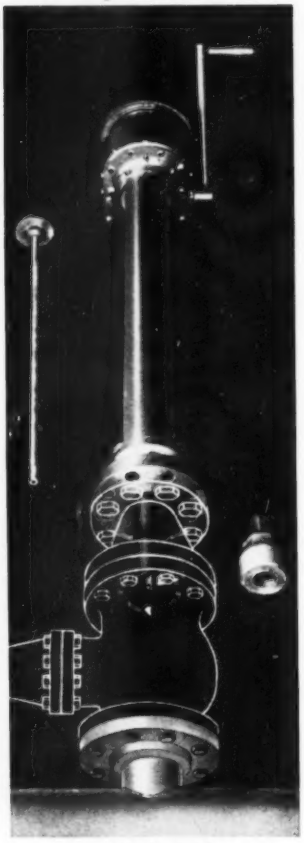

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*Patent No. 2,097,395
Other Patents Pending.

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Pipe-Line Construction

FOLLOWING is a tabulation of pipe-line projects, both domestic and foreign, which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines—Domestic

Arizona Pipe Line Co.—600 miles 8-in., planned, Permian basin area to Phoenix.

Atlantic Pipe Line Co.—420 miles 10-in., under construction, Crane to Harbor Island, Tex.; Evans & James, contractor.

Humble Pipe Line Co.—375 miles 18-in., planned, West Texas-Satsuma Station to Baytown, Tex.

Interstate Oil Pipe Line Co.—85 miles 12-in., under construction, Elk Basin to Billings, Mont.; C. B. Edmonds Transportation Co., contractor.

Mid-Valley Pipe Line Co. (Sun and Ohio).—1,000 miles 20-22-in., planned, Longview, Tex., to Mayersville, Miss.-Covington, Ky., to Lima, Ohio. Contracts let for 857 miles, as follows: Section 2, Haynesville, La., to Mayersville, Miss., Latex Construction Co.; Section 3-A, Mayersville to Oakland, Miss., Associated Pipe Line Contractors, Inc.; Section 3-B, 4-A, Oakland, Miss., to Henderson, Tenn., Eastern Construction Co.; Section 4-B, 5-A, Henderson to Clarksville, Tenn., Eastern Construction Co.; Section 5-B, 6-A, Clarksville, Tenn., to Elizabethtown, Ky., Britton Construction Co.; Section 6-B, Elizabethtown to Hebron, Ky., H. L. Gentry Construction Co.; Section 7 South, Hebron, Ky., to Eaton, Ohio, Britton Construction Co.; Section 7 North, Eaton to Lima, Ohio; Section 8, Magnolia, Ark., to Haynesville, La.

Phillips Pipe Line Co.—54 miles 8-in., under construction, Thrall to Kansas City, Kans.; Morrison-Wilson-Anderson Brothers, contractors.

Portland Pipe Line Co., Montreal Pipe Line Co., Ltd.—236 miles 22-in., planned, Portland, Me., to Montreal, Que., Canada.

Shell Pipe Line Corp.—190 miles 10¾-in., take up, Cushing, Okla., to Emmitt, Mo.; under way; Trojan Construction Co., Inc., contractor; spread office at Vinita, Okla.; Maurice W. Crawford, spreadman.

160 miles 10¾-in., Cushing, Okla., to Elk City, Okla.; under construction; Trojan Construction Co., Inc., contractor; spread office, Guthrie, Okla.; Swede Tillotson, spreadman.

Skelly Oil Co.—33 miles 8-in., Burrton to El Dorado, Kans., under construction; spread office, Halstead, Kans.; C. M. Clark, spreadman.

40 miles 8-in., reclaim, Burrton to El Dorado, Kans.

Socony-Vacuum Oil Co., Inc. (White Eagle Division)—122 miles 8-in., considered, Big Horn Basin to Casper, Wyo.

Stanolind Pipe-Line Co.—31 miles 10-12-in., under construction, Elmont and Blaine Stations, Kans., loops; C. S. Foreman, contractor.

Sun Pipe Line Co.—61 miles 4-10-in., authorized, Seabreeze to Sun Station, Tex.

Texas Pipe Line Co.—131 miles 12-in., under construction, Corsicana to Chico, Tex.; Smith Contracting Corp., contractor.

187 miles 12-in., authorized, Wichita Falls to Corsicana, Tex.

Texas-Empire Pipe Line Co.—40 miles 16-in., authorized, Wilmington, Ill., to East Chicago, Ind.

Texas-New Mexico Pipe Line Co.—42 miles 10-in., authorized, Colorado City to Borden County, Texas.

35 miles 10-6-4-in., authorized, Borden and Howard counties, Texas.

Products Pipe Lines—Domestic

Buckeye Pipe Line Co.—140 miles 8-in., Speedway City, Ind., to Lima, Ohio; under construction; H. L. Gentry Construction Co., contractor; spread office, St. Marys, Ohio; Frank Morris, spreadman.

Great Lakes Pipe Line Co.—1,298 miles 12-in., planned, looping from Tulsa north.

150 miles 8-in., planned, looping.

950 miles 12-in., authorized, looping.

65 miles 12-in., under construction, north from Des Moines; O. R. Burden Construction Corp., contractor.

72 miles 12-in., under construction, to Iowa-Minnesota state line; A. C. Holder Construction Co., contractor.

52 miles 15-in., St. Paul to Fairbault, Minn.; under construction; Sheehan Pipe Line Construction Co., contractor; spread office, South St. Paul, Minn.; J. W. Brown, spreadman.

52 miles 15-in., Albert Lea to Fairbault, Minn.; under construction; Sheehan Pipe Line Construction Co., contractor; spread office, Albert Lea, Minn.; C. W. Henderson, spreadman.

165 miles 12-in., Irvington, Neb., to Sioux Falls, S. D., planned.

Phillips Petroleum Co. and Shamrock Oil & Gas Co.—152 miles 6-in., planned, La Junta to Denver, Colo.

Salt Lake Pipe Line Co.—320 miles 8-in., planned, Salt Lake City to Boise, Idaho; Smith Contracting Co., Oklahoma Contracting Co., Grafe-Callahan Construction Co., contractors.

242 miles, 6-8-in., Boise, Idaho-Pasco, Wash., planned.

Sinclair Refining Co.—700 miles 8-in., planned, Sinclair, Wyo., to Kansas City, Mo.

Standard Oil Co. (Ohio)—38 miles 8-in., authorized, Toledo to Fosteria, Ohio.

Natural-Gas Pipe Lines—Domestic

Alabama-Tennessee Natural Gas Co.—80 miles 10-in., planned, from Tennessee Gas Transmission Co. line near Selmer, Tenn., to Tuscombia, Ala.; Lehman-Hoge & Scott, contractor.

61 miles 6-8-in., planned, Huntsville to Tuscombia, Ala.

80 miles 11-in., under construction, Selmer, Tenn., to Muscle Shoals, Ala.; Lehman-Hoge & Scott, contractor.

36 miles 6-8-in., authorized, Muscle Shoals to Decatur, Ala.

Arkansas Louisiana Gas Co.—162 miles 20-in., under construction, Waskom, Tex., and Perla, Ark.; Anderson Brothers Co., Latex Construction Co., contractors.

70 miles 20-in., under construction, Waskom, Tex., to Magnolia, Ark.; Anderson Brothers, contractor.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.)—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Atomic Energy Commission (U. S. Government)—95 miles 12-in., under construction, Bloomfield to Los Alamos, N. M.; Morrison-Haddoc Engineering Co., contractor.

Atlantic Seaboard Corp., Virginia Gas Transmission Corp.—68 miles 26-in., Strasburg, Va., to Rockville, Md.; under construction; H. C. Price Co., contractor; spread office, Winchester, Va.; R. K. Shivel, spreadman.

68 miles 26-in., Mouth of Seneca, W. Va., to Cleveland, W. Va.; under construction; H. C. Price Co., contractor; spread office, Elkins, W. Va.; W. B. Williams, contractor.

70 miles 26-in., Mouth of Seneca, W. Va., to Strasburg, Va.; under construction; H. C. Price Co., contractor; spread office, Woodstock, Va.; C. R. Ice, spreadman.

50 miles 30-in., Greenville, to Rulville, Miss.; under construction; H. C. Price Co., contractor; spread office, Leland, Miss.; G. A. Reutzel, spreadman.

Atlantic Seaboard Corp.—75 miles 26-in., near Clendenin, W. Va., to northeast, under construction; Ray L. Smith & Son., Inc., contractor; spread offices located at: Gassaway, W. Va., with W. G. Frost, spreadman; and Buckhannon, W. Va., with Don Smith, spreadman.

Carthage Hydrocol, Inc.—63 miles 10-16-in., under construction, San Salvador area to Carthage Synthetic Gasoline Plant, Brownsville, Tex.; H B. Zachry, contractor.

Central Hudson Gas & Electric Corp.—40 miles, planned, Tuxedo, N. Y., station, Home Gas Co. line now under construction, to Poughkeepsie, N. Y.

Central Kentucky Natural Gas Co.—38 miles 12-20-in., planned, Kentucky loops.

Chicago District Pipe Line Co.—41 miles 24-in., planned, Joliet, Ill., to Chicago.

City of Indianapolis, Ind., Inc.—55 miles 16-in., proposed, Indianapolis to Texas Eastern Transmission Corp.'s system.

Coast Counties Gas & Electric Co.—40 miles 3-4-8-in., planned, coast and valley region, California.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Colorado Interstate Gas Co.—38 miles 20-in., planned, Texas Panhandle and Hugoton field, Kansas, to Denver, looping. Cheek Construction Co., contractor; Troy Cheek, superintendent.

Colorado Interstate Gas Co.—15.7 miles in Kansas; spread office, Liberal, Kans.; Tubby Boyd, spreadman; Arkansas River crossing, spread office, Liberal, Kans.; Pat Patterson, spreadman.

Colorado-Wyoming Gas Co.—41 miles, planned, Greeley, LaSalle, and Windsor, Colo., areas.

Columbia Gas System, Inc.—38 miles 20-16-in., under construction, Fairfield County, Ohio, to Columbus; Mahoney Contracting Co. contractor.

49 miles 10-8-in., under construction, Port Jervis, N. Y., to West Nyack, N. Y.; Williams Brothers, contractor.

Commonwealth Natural Gas Corp.—537 miles 20-in., planned, West Bend, Ky., to Norfolk, Va.

200 miles, planned, Green County, Virginia, to Norfolk.

Continental Oil Co.—35 miles 2-20-in., under construction, Big Lake, Tex.; George Tucker Pipe Line Construction Co., contractor.

Consolidated Gas & Electric Co.—15 miles 26-in., in Baltimore, Md.; under construction; Pipe Line Construction & Drilling Co., contractor; spread office, Baltimore; R. L. O'Neil, spreadman.

Consolidated Gas Utilities Corp.—41 miles 12-in., planned, Enid-Blackwell and Marlow-Cement, Okla.

Egyptian Natural Gas Co.—80 miles 6-8-in. planned, Norris City to Salem-Centralia, Ill., areas.

East Tennessee Natural Gas Co.—398 miles 3-16-in., planned, Nashville-Chattanooga-Knoxville, Tenn., and lateral lines.

172 miles 22-in., under construction, Greenbrier, Tenn., to Oak Ridge; Oman-Fulton & Brodie, contractor.

185 miles, 16-in., Lobelville-Chattanooga, Tenn., contracted by Walters & Saigh Con. Co. for construction in 1950; 120 miles, 12-in., Chattanooga - Knoxville, Tenn., contracted by Walters & Saigh Con. Co. for construction in 1950; 100 miles of laterals to be laid in 1950. Construction 150 miles, 16-in., Knoxville-Bristol, Tenn., under consideration.

El Paso Natural Gas Co.—91.3 miles, planned, Almagordo, N. M., to Willcox, Ariz.

105 miles 24-in., planned, Upton County, Texas-Jal, N. M., all work by company crews.

102 miles 26-in., planned, Crossover South to Topock, Ariz.

450 miles 30-in., under construction. Eunice, N. M.-Blythe, Calif., looping.

451 miles, 24-in., planned, Farmington, N. M. (San Juan basin)-Topock, Ariz.

270 miles, planned, laterals for San Juan project.

Gulf Oil Corp.—40 miles 3-24-in., under construction, Eunice, N. M., gathering system and gasoline plant; Younger Construction Co., contractor.

Gulfcoast Northern Gas Co.—1,184 miles 26-in., proposed, Corpus Christi, Tex., area, to Illinois.

Home Gas Co.—70 miles, planned, Orange Sullivan-Rockland counties, New York-Cattaragus County, New York, areas.

Hope Natural Gas Co.—32 miles 16-in., under construction, Hastings to Clarksburg, W. Va.; Pipe Line Construction & Drilling Co., contractor.

Jersey Central Power & Light Co.—39.4 miles 10-in., planned, New Jersey to Coast system, Texas Eastern Transmission Co.'s Big Inch.

Kansas-Nebraska Natural Gas Co., Inc.—301 miles, authorized, Kansas-Nebraska area, including the following contracted to Rumsey Brothers Pipe Line Construction Co.: 10 miles 12¾-in., replacing 8-in. in Alma-Holdredge, Nebr., line; 7 miles 8⅝-in., and 44 miles of 6⅝-in., Elm Creek to Loup City, Nebr.; 18 miles 4½-in., and 18 miles 3½-in., Litchfield to Broken Bow, Nebr.; and 10 miles 6⅝-in., Red Cloud to Guide Rock, Nebr.

Kansas Light & Power Co.—146 miles 20-22-in., under construction, Ulysses to Pratt, Kans.; M. J. White, contractor.

Lone Star Gas Co.—214 miles 6-8-in., under construction, Pottsville, Texas, field to surrounding towns serving "Hill district."

Magnolia Petroleum Co.—70 miles, all sizes, gathering system for gasoline plant; Pipe Line Service Co., contractor; field office, Healdton, Okla.; G. Pack, spreadman.

35 miles 4-5-in., under construction; gathering system for gasoline plant; Pipeline Service Co., contractor; spread office, Lindsay, Okla.; Red Dowdson, spreadman.

McCarty Oil & Gas Co.—100 miles 12-13-16-20-in., under construction, Jackson Pasture to Orange, Tex.; Anderson Brothers, contractors.

Michigan Gas Storage Co.—113 miles 20-in., under construction, laying 61 mi.

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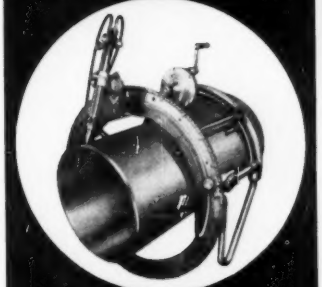

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Crose pipe cutting and beveling machines are sturdy light weight construction made from cast aluminum. Simple operation. This machine has a split ring which enables it to be installed over the pipe for cut outs. The out-of-round cutting attachment allows you to cut true bevels on bent or egged pipe. Machines to cut and bevel pipe up to and including 36 inches in diameter are available for immediate delivery.

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Freedona - Laingsburg - Lansing, Mich., Mahoney Contracting Co., contractor.

150 miles 20-in., planned, Chelsia Terminal-Winterfield and Cranberry Lake, Mich.; Mahoney Contracting Co., contractor.

Michigan-Wisconsin Gas Co.—100 miles 10-in., under construction in Wisconsin; Anderson Brothers, contractor.

341 miles 24-in., under construction, Maryville, Mo., to Sandwich, Ill.; J. R. Horrigan Construction Co., contractor.

106 miles 22-in., under construction, Sandwich, Ill., to Milwaukee; J. R. Horrigan Construction Co., contractor.

256 miles 22 in., under construction, Sandwich, Ill., to Big Rapids, Wis.; J. R. Horrigan Construction Co., contractor.

59 miles 4-3-2-in., under construction, Fort Madison to Mount Pleasant, Iowa; Rumsey Brothers Construction Co., contractor.

97 miles 22-10-in., under construction, Racine to Stoughton, Wis.; Anderson Brothers, contractor.

188 miles 4-14-in., authorized, in Wisconsin.

170 miles 24-in., under construction, Sandwich Junction, Ill., to Mount Pleasant, Iowa; J. R. Horrigan Construction Co., contractor.

180 miles 22-in., under construction, Milwaukee to Burlington, Wis.; J. R. Horrigan Construction Co., contractor.

180 miles 22-in., under construction, Big Rapids, Mich., to Crown Point, Ind.; Oklahoma Contracting Co., contractor.

Mississippi River Fuel Corp.—224 miles 24-in., under construction, Northwest Louisiana to Fredericktown, Mo., looping; R. B. Potashnick, contractor.

Mississippi River Fuel Corp.—10 miles 20-24-in., under construction; Sheehan Pipe Line Construction Co., contractor; spread office, East St. Louis, Ill.; C. M. Brown, spreadman.

Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co.—340 miles 12¾-in., planned, Worland, Wyo., to Cabin Creek, Mont.

Montana-Dakota Utilities Co.—30 miles 4-in., authorized, Saco and Baker, Mont.

60 miles 3-12-in., authorized, field lines for 1948 construction.

Northeastern Gas Transmission Co.—511 miles, up to 20-in., planned, in New England area.

Northern Natural Gas Co.—41 miles 20-in., under construction, Southwest from Garden City, Kans.; R. H. Fulton & Co., contractor.

Northern Natural Gas Co.—3,000 ft. 24-in. lay and 24-in. take up, planned; R. H. Fulton & Co., contractor.

15 miles 4 to 20-in., near Skellytown, Tex., planned; R. H. Fulton & Co., contractor.

6.5 miles 6-in., near Beatrice, Neb., planned; R. H. Fulton & Co., contractor.

62 miles 20-24-in., under way, Garden City, Kans., area; R. H. Fulton & Co., contractor; Ed Veach, spreadman.

58 miles 4-24-in., authorized, Hugoton and Panhandle fields.

135 miles 20-24-in., under construction, Iowa, Minnesota, Kansas, and Nebraska; C. G. Griffis Construction Co., Eastern Construction Co., contractors.

88 miles, all sizes, planned, Kansas-Nebraska looping.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—38 miles 16-20-in., under construction, Sugar Grove and New Albany, Ohio; Mahoney Contracting Co., contractor.

86 miles 20-in., under construction, Crawford-Lick Station, Ohio; Lick-South Point Stations, Ohio; Midwestern and Anderson Brothers, contractors.

48 miles 20-in., under construction, Mount Gilead to Treat Station; Pavonia Station to Washington, C. H., Ohio; Mahoney Contracting Co., contractor.

85 miles, planned, Central Ohio replacement.

Pacific Gas & Electric Co.—47 miles 8-in., authorized, Salinas to Kilig City, Calif.

Pacific Gas & Electric Co.—506 miles 34-in., under construction, Topock, Calif.-Milpitas, Calif.; Bechtel Corp., contractor; spread office, Hollister, Calif.; R. L. Bowman, spreadman.

Panhandle Eastern Pipe Line Co.—50 miles 26-in., under construction, Illinois, Indiana, and Missouri; Anderson Brothers, contractor.

356 miles 26-in., authorized, looping in Texas, Oklahoma, Kansas, Missouri, Illinois, Indana, Ohio, and Michigan.

85 miles 24-26-in., under construction; loops near Liberal, Kans.; R. H. Fulton & Co., contractor.

132 miles 26-in., under construction, Kansas, Missouri, Illinois, Indiana, and Ohio; R. H. Fulton & Co., C. S. Foreman & Co., and Anderson Brothers, contractors.

252 miles 26-in., authorized, loops from Texas and Michigan.

Peoples Gas Light & Coke Co.—1,000 miles 30-in., planned, Houston to Joliet, Ill.

Peoples Natural Gas Co.—38.3 miles 14-in., under construction, Somerset-Johnstown, Pa.; Williams-Austin Co., contractor.

Phillips Petroleum Co.—25 miles gathering system in West Edmond, Okla., field; under construction; Vaughn & Taylor Construction Co., Inc., contractor; spread office, Edmond, Okla.

Piedmont Natural Gas Corp.—1,290 miles 20-in., planned, upper Gulf Coast area to Danville, Va.

San Diego Gas & Electric Co.—53 miles 16-in., planned, San Diego County, California.

San Diego Gas & Electric Co. (Southern Counties Gas Co.)—85 miles, authorized, San Diego-Riverside-Moreno, Calif.

Southern Counties Gas Co.—88 miles 30-in., planned, Whitewater to Rosemead, Calif.

35 miles 16-in., planned, Moreno to San Diego County, California.

Southern Natural Gas Co.—138 miles 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

375 miles 24-in., planned, Gwinville, Miss., to Atlanta.

225 miles 16-in., planned, Colfax, Ga., extension.

61 miles 24-in., under construction; Eastern Alabama loop; Latex Construction Co., contractor.

110 miles 11-in., considered; extension.

32 miles 13-in., under construction, branch line loop in Alabama; Ford, Bascom & Davis Construction Co., contractor.

314 miles 18-in., planned; extension.

171 miles 16-in., planned; extension.

118 miles 13-in., planned; extension.

Southern Union Gas Co.—78 miles 8-10-14-in., planned, New Mexico loops and laterals.

Tennessee Gas Transmission Co.—155 miles 30-in., authorized, central Louisiana to Northern Tennessee, looping.

200 miles 30-24-in., under construction, looping from Hemphill, Tex., to Monroe, La.; Morrison Construction Co., H. C. Price, contractors.

53.5 miles 30-in., under construction, Harris and San Jacinto counties, Texas; Morrison Construction Co., contractor.

52 miles 24-30-in., under construction, Refugio to Victoria; H. C. Price, contractor.

65 miles 16-in., planned, Ohio-Pittsburgh spur.

790 miles 20-26-in., planned, Burnaugh, Ky., to Boston, including 395-mile line to Buffalo.

992 miles 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

47 miles 30-in., authorized, Louisiana.

45 miles 30-in., authorized, Tennessee.

Texas-Eastern Transmission Corp.—1,400 miles 26-in., planned, Texas to Pittsburgh loops.

55 miles 26-in., under construction, Bealville to Woodsfield, Ohio, looping; Williams Brothers, contractor.

Texas Eastern Transmission Corp.—37½ miles 20-in., Lisbon to Lucky, La., under construction; Associated Pipe Line Contractors, Inc., contractor; spread office, Arcadia, La.; J. A. Williamson, spreadman.

69 miles 20-in., planned, looping in Beaumont, Tex., and Castor to Lisbon, La.

723 miles 26-in., under construction, Lisbon, La., to Middletown, Ohio.

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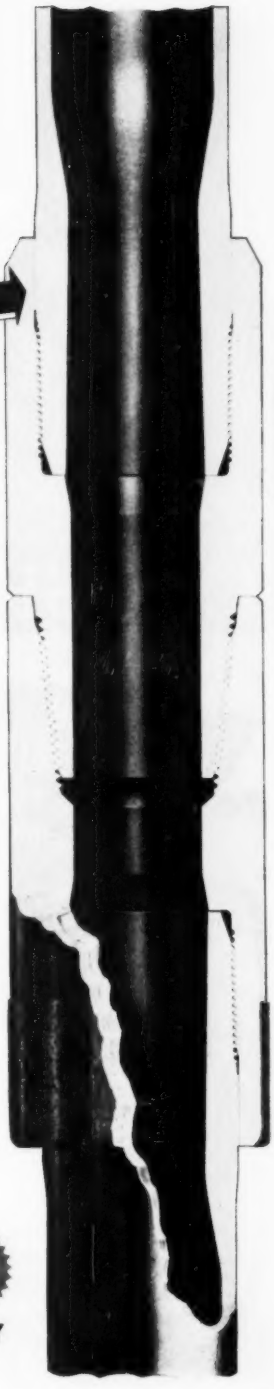

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110 miles 20-in., under construction, Carthage, Tex., to Lisbon, La.; N. A. Saigh, contractor.

100 miles 16-in., planned, Provident City field to Lavaca County to Baytown, Tex.

Texas Gas Transmission Corp.—101 miles 26-in., planned, Sharon, La., to Lake Village, Ark., northeast; Latex Construction Co., contractor, Eudora, Ark., field office.

Texas Gas Transmission Corp.—15,000 ft. 16-in., Mississippi River crossing, 4-16-in. high-pressure gas lines near Greenville, Miss.; under construction; N. A. Saigh Co., Inc., contractor; spread office, Greenville, Miss.; Carl Doyle, superintendent.

103 miles 20-in., Carthage, Tex., to near Lisbon, La. (Sharon); under construction; N. A. Saigh Co., Inc., contractor; spread office, Carthage, Tex.; Bob Floyd, spreadman.

80 miles, 26-in., under way, Madison, Ind., to Warren County, Ohio, Midwestern Constructors, Inc.

166 miles, 26-in., Slaughters-Ohio River, Williams Brothers Corp.

The Memphis, Tenn.-Slaughters, Ky., section of 26-in. has been contracted by J. R. Horrigan Construction Co.

32 miles, planned, Madisonville to Evansvile, Ind.

Texas Illinois Natural Gas Pipeline Co.—1,000 miles 30-in., planned, Houston to Joliet, Ill.

Transcontinental Gas Pipe Line Co.—605 miles 30-in., under construction, Texas to New York; Morrison Brothers Construction Co., Wunderlich & Griffis Construction Co., Midwestern Constructors, Inc., Williams Brothers Corp., contractors.

1,840 miles, under construction, main line 70 miles 20-in., 460 miles 26-in., 1,210 miles 30-in., Rio Grande Valley, Texas, to New York City.

36 miles, planned, New Jersey to New York-Connecticut line.

380 miles 8-16-in., planned, laterals to gas field.

216 miles 30-in., under construction, Demopolis, Ala., to Newnan, Ga.; Midwestern Construction, Inc., contractor; field office at Clanton, Ala.; M. T. Wilhite in charge.

United Fuel Gas Co.—32 miles 20-in., authorized, Roane, Calhoun, and Wetzel counties, West Virginia.

United Gas Pipe Line Co.—80 miles 2-4-6-in., under construction, laterals, North Mississippi; L. E. Farley Construction Co., contractor.

105.6 miles 20-in., planned, loop line paralleling Carthage, Tex.-Sterlington, La., and extending on to near Monroe, La.

United Natural Gas Co.—29 miles 12-in., authorized, laterals, Elk County, Pennsylvania.

Washington Light Co.—30 miles 6-12-in., under construction, Washington, Pa.; Britton Contracting Co., contractor.

Crude-Oil Pipe Lines—Foreign

Anglo-Iranian Oil Co., Ltd.—56 miles 20-22-in., under construction, Agha Jari to Mashur, Iran.

Corporacion de Fomento de Chile.—45 miles 8-in., planned, Cerro Manatiales (Springhill) to Caleta Clarencia (on Bahia Gente Grande), contracted by Techint Pipe Line Division, Technia International, S.A.

Inter-Provincial Pipe Line Co. (Imperial)—1,150 miles 16-20-in., planned, Edmonton area, to Superior, Wis.

Imperial Oil, Ltd.—85 miles 4-8-in., under construction, Redwater and Deron, Alta., Canada; Sparling-Davis Co., Ltd., contractor.

Iraq Petroleum Co., Ltd.—1,080 miles 16-in., under construction, Kirkuk, Iraq, to Haifa, Palestine, and Tripoli, Lebanon.

556 miles 30-32-in., planned, Iraq-Levantine Port.

Kuwait Oil Co. (Gulf and Anglo-Iranian)—1,100 miles 30-in., planned, Kuwait, Arabia, to Levantine Port.

600 miles 4-30-in., under construction, Bechtel-Kuwait, Arabia.

Middle East Pipe Line Co.—800 miles 34-36-in., planned, Iran-Levantine Port.

Petroleos Mexicanos.—280 miles 12¾-in., authorized, Poza Rica to Salamanca, Mexico.

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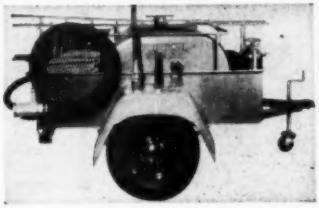

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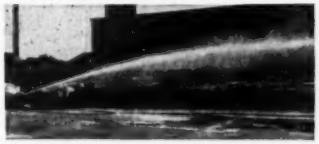

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NATURAL GAS

$120,000,000 Being Spent by P. G. & E. on Expansion

Nearly $120,000,000 is being spent by Pacific Gas & Electric Co. for expansion of its natural-gas transmission and distribution facilities to meet the demand created by population growth of northern and Central California. Outlays from 1945 to 1948 inclusive approximated $43,000,000 and projects now under way or authorized so far this year will cost about $75,000,000, the company reported.

The program includes hundreds of miles of new transmission and distribution pipe lines, storage holders, compressor stations, and other facilities.

Outstanding on the long list of jobs is the Super Inch steel pipe line—a 1,600-mile transmission system that will bring natural gas from fields in Texas and New Mexico to northern California. This 1,600-mile system is a joint project of the El Paso Natural Gas Co. and the P. G. & E. El Paso's section runs from the gas fields to the California-Arizona border at Topock, near Needles, and the P. G. & E. is building the 506 miles from Topock to Milpitas, Santa Clara County, where the line will feed into the company's network.

Largest in Diameter

The Topock-Milpitas section of the Super Inch will be 34 in. in diameter—the largest diameter pipe line in the world for transmission of natural gas. Its cost is estimated at $63,000,000. Over-all cost of the project will be approximately $150,000,000.

Work began June 29 on an 80-mile section of the line from Llanada, in the Panoche Hills south of Hollister, to Milpitas, and about 30 miles of this link have been completed. Schedule for the entire Super Inch provides that deliveries of Texas-New Mexico gas will begin early in 1951.

Initial supply will be at the rate of 150,000,000 cu. ft. daily with an additional 100,000,000 cu. ft. by 1952 and probable further increases in succeeding years up to a maximum of 500,000,000 cu. ft. per day.

An important part of the expansion program is construction of additional storage facilities to provide reserves supplies of gas for use in periods of peak demand throughout the system. Projects now under construction or authorized to be built will provide total new storage capacity of more than 50,000,000 cu. ft. of gas at a cost of approximately $15,600,000. They include: At Richmond, gas holder, 17,000,000 cu. ft. capacity, nearly completed; at San Francisco, gas holder, 17,000,000 cu. ft. capacity, preliminary work under way; at Fresno, underground storage, 7,000,000 cu. ft. capacity, now under construction; and at San Rafael, underground storage, 6,000,000 cu. ft. capacity.

Underground storage facilities each with 3,000,000 cu. ft. capacity also are planned to be built at Modesto and Yuba City.

Nearly 100 miles of new transmission mains to serve increased customers demand have been built or are planned in the East Bay area and other parts of the company's natural-gas network.

Hearings on Gas Service in Virginia Will Reconvene

Hearings will reconvene before Federal Power Commission October 24 in Washington, D. C., in the consolidated proceedings involving applications in connection with the proposed construction and operation of pipe-line facilities which would be used to transport natural gas to markets in Virginia. Hearings previously had been recessed until December 5.

The proceedings involve applications filed by Commonwealth Natural Gas Corp., Piedmont Natural Gas Corp., and Virginia Gas Transmission Corp. An application filed by Tennessee Gas Transmission Co. was consolidated with the other applications in the concurrent order issued recently by the commission.

Commonwealth and Piedmont propose to transport and sell natural gas for resale in Richmond and Norfolk, while Virginia Gas is proposing to deliver and sell natural gas to Commonwealth to meet the company's requirements. Tennessee Gas has asked FPC to authorize the sale of natural gas to United Fuel Gas Co. for resale to its affiliate, Virginia Gas, to enable the latter company to supply Commonwealth's requirements.

Virginia Natural Gas Co. and Eastern Natural Gas Co., which also proposed natural-gas service in Virginia, both have filed notices of withdrawal of their applications, but commission approval is necessary before the withdrawals can become effective.

Hearing on the applications began September 14 in Washington, and on October 5 were recessed by the examiner for 60 days on a motion by Piedmont. Commonwealth and Virginia Gas subsequently appealed this ruling to the commission.

FPC's recent order set the following sequence for the presentation of additional evidence at the reconvened hearings: Tennessee Gas Transmission Co., Commonwealth Natural Gas Corp., and Virginia Gas Transmission Corp. The commission directed that Piedmont shall proceed with its presentation not later than November 28.

Oral Argument Scheduled on Colorado Interstate Tariff

Federal Power Commission has scheduled an oral argument to be held October 20 in Washington, D. C., in the proceeding involving FPC's suspension of the proposed natural-gas tariff filed by Colorado Interstate Gas Co., of Colorado Springs, Colo.

The commission suspended the tariff last May, pending hearing and decision, and hearings were subsequently held in Denver. Last month an FPC presiding examiner issued an initial decision ordering one volume of the proposed tariff accepted for filing but ordering the company to refile a second volume. Exceptions were filed to the examiner's decision, and the oral argument will be held with respect to both volumes of the proposed tariff.

Casing-Head Gas-Collection Plant Is Built by Dow Co.

Construction of a compressor station and pipe line to collect vented gas from the Beaver Creek oil field 5 miles northwest of Higgins Lake, Mich., has been announced by L. J. Richards, chief engineer, Dow Chemical Co. This is the second such installation in Michigan made by the firm.

Collected casing-head gas will be used as fuel and cracking stock for the next 5 to 8 years to augment the present supply of gas at the Midland, Mich., plant. The company's Ludington plant started operation September 1, for an estimated 5 to 8-year period, on gases similarly collected from the Pentwater, Mich., field.

A battery of three 440-hp. compressors will be used to boost the casing-head pressure from 5 psi. to 500 psi. and move it to Midland. The new 56 miles of 8-in. welded steel line starting at the compressor station about 5 miles northwest of Higgins Lake runs south to Loomis. It then joins the old Dow line installed in 1939 and continues to Midland. The first gas will reach company furnaces shortly after the first of the year.

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REFINING

Continental Completes New Perco Unit; Shamrock Builds

Continental Oil Co. has completed construction of a 20,000-bbl.-per-day Perco liquid copper treater at its Ponca City, Okla., refinery.

The unit, consisting of four independent 5,000-bbl.-per-day sections, will treat straightrun and cracked gasolines as well as kerosine and burning-oil fractions. The treater has been on stream since August.

Shamrock Oil & Gas Co. is constructing a Perco Cycloversion unit at its Sunray, Tex., refinery, which is designed for a capacity of 1,500 bbl. daily. Upon completion in 1950 the unit will be operated for both gas-oil cracking and naphtha reforming.

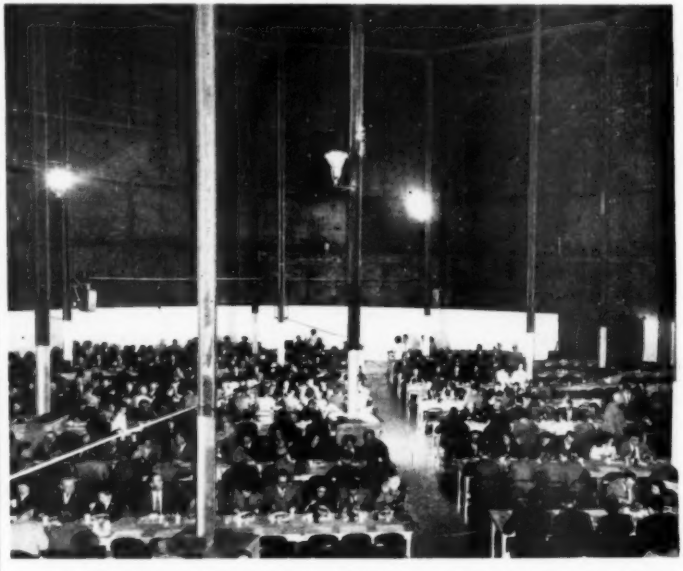
Shamrock has designed the catalyst-chamber sections for completely automatic valve control.

S.A.E. Meeting Slated for November 1-4 in St. Louis

Programs have been completed for the Society of Automotive Engineers' National Diesel Engine meeting in St. Louis November 1-2, and the S.A.E. National Fuels and Lubricants meeting, which will follow on November 3-4. All meetings will be held in the Chase Hotel.

The 2-day diesel-engine meeting will include technical papers and inspection trips to various diesel operations in the St. Louis area, and is sponsored by the S.A.E. Diesel Engine Activity with cooperation of St. Louis Section, S.A.E. A. J. Jeude, of Busch-Sulzer Bros. Diesel Engine Division, Nordberg Manufacturing Co., St. Louis, will serve as general chairman.

The program of the National Fuels and Lubricants group, to be held November 3-4, will feature 10 technical papers outlining methods and results of extensive road and laboratory tests productive of findings representing progressive steps in the engineering task of coordinating fuels, lubricants, and equipment for satisfactory performance. Emphasis will be placed upon lubrication, and especially lubricants for gears and automatic transmissions. A. L. Heintze, Sinclair Refining Co., New York, will serve as general chairman.



Guests at the recent opening of Continental Oil Co.'s new refinery at Billings, Mont., dined in an unusual setting, as this photograph shows. The "dining room" was a 55,000-bbl. storage tank on the refinery grounds which was specially adapted for the occasion. More than 6,000 guests were fed during the open house in shifts of approximately 500 at a time. The refinery is Continental's largest in the Rocky Mountain area

One of the highlights of the meeting will be a joint dinner meeting November 2 of the two groups, during which time Charles F. Kettering, a director of General Motors Corp., Detroit, will speak on "Future Problems of the Internal Combustion Engine."

A.P.I. Completes Monograph On Hydrocarbon Properties

Completion of a monograph on the "Thermodynamic Properties of the Lighter Paraffin Hydrocarbons and Nitrogen" has been announced by T. V. Moore, chairman of the American Petroleum Institute's advisory committee on fundamental research on occurrence and recovery of petroleum.

The monograph was compiled by B. H. Sage and W. N. Lacey and is now being prepared for publication. Orders for the book may be placed now with the American Petroleum Institute in New York for delivery next year.

The monograph is a compilation of data resulting from a series of investigations of the lighter paraffin hydrocarbons and their mixtures, carried out by A.P.I. Research Project 37 (California Institute of Technology, Pasadena) during the period 1930 to 1946.

The work included studies of the volumetric behavior, heat capacity, latent heat of vaporization, heat of solution, and the Joule-Thompson coefficent of the pure hydrocarbons and some two and three-component mixtures.

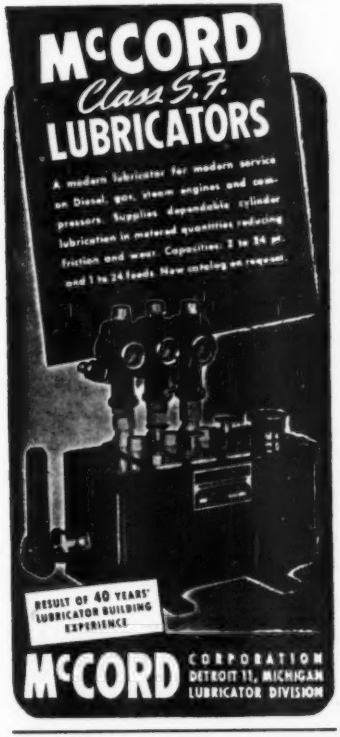
Texans Say Refiners Lost $200,000,000 in 8 Months

HOUSTON.—Two Corpus Christi refinery executives said last week that refiners and sellers of refined products in the United States have suffered a $200,000,000 loss in the past 8 months

The statement was made by Edwin W. Singer, president, Pontiac Refining Corp., and S. S. Seltzer, Jr., vice president, Southwestern Oil & Refining Co., in reply to the statement of Sen. Burnet Maybank (Dem., South Carolina) that refiners should be "patriotic" and lower gasoline prices. The two oil men said that most of the dollar loss was caused by "severe price drops in all refined products." They added that some refineries have been forced to shut down.

The refining industry "has a long history of passing all cost reductions and products improvements on to the public," they said. Statistics were cited by the two Corpus Christi men to back up their position. In 1926, gasoline sold at the refinery for 13¾ cents a gallon, and at the present time top grades of gasoline bring only 10 cents a gallon. In 1926, the industry sold its products for 160 per cent of the cost of crude, but during the first 8 months of 1949, the price of products had dropped to 105 per cent of the cost of crude. They added, that this 5 per cent margin does not cover even a "small fraction" of refining costs.

In their letter to Senator Maybank, Singer and Seltzer told him that they did not think that cutting the price of crude would solve their difficulties.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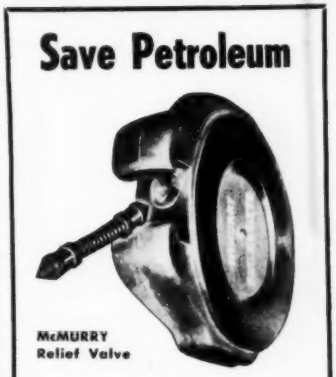
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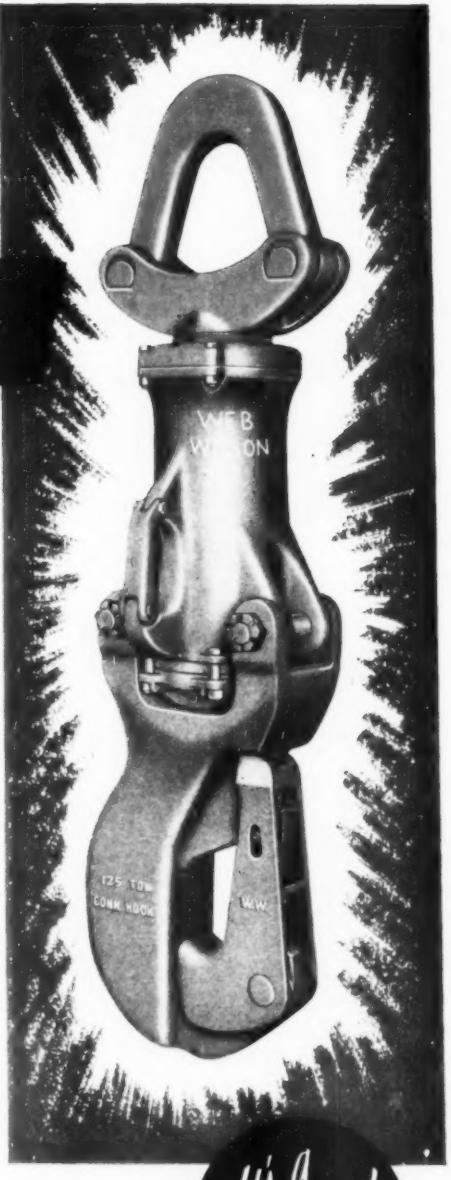

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Number of Operating Rigs Renews Downward Trend

The increase in drilling activity indicated during the week ended October 3 failed to establish a trend with the number of rotary rigs operating in the United States and western Canada again showing a drop during the week ended October 10 (latest report). The decline brought the total number of active rigs in these areas down to only 6 above the low point (1,990) reached before increase of the October 3 report. Chief decline was in the Gulf Coast area. Increases were reported only in West Texas and New Mexico and on the Pacific Coast. Active rigs by areas follow:

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 10-10-49	Change week ended 10-3-49	Change week ended 10-11-48
Gulf Coast	463	—37	—118
W. Tex.-N. M.	591	+11	—16
Ark.-N. La.-E. Tex.	155	—4	—23
Oklahoma	224	—8	—65
Kansas	126	—1	—23
Illinois-Eastern	114	—7	—61
Rocky Mountain	108	0	—63
Pacific Coast	160	+14	—3
Total U. S.	1,941	—32	—372
Western Canada	55	—8	+4
Total	1,996	—40	—368

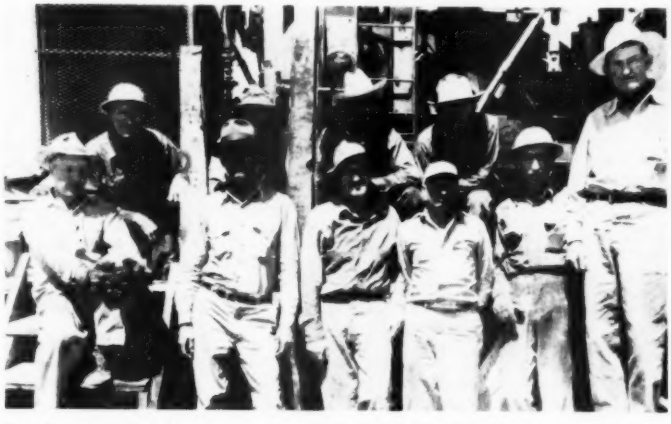
*Courtesy Hughes Tool Co.

E. A. Rumley, Oklahoma City, is moving in tools to go back in an old hole a half mile south of the West Moore pool in Cleveland County, Oklahoma, and retest the Hunton lime for Ashland Oil & Refining Co. The location, 1 Harden, 31-10n-3w, originally was drilled for Sunray Oil Corp. to a depth of 8,965 ft. in the Wilcox.

Noble Drilling Co., Tulsa, has been given contracts for two more wells to be drilled for California Co. in the Gulf of Mexico off the Louisiana Coast. One is for 1-B State, Block 69, Main Pass, a 9,000-ft. test, off the Plaquemines Parish coast. The other is for 1-D State, Block 2, Bay Marchand field, off the Lafourche Parish coast. The latter, projected to 4,600 ft., will be directionally drilled.

P. M. Harbour, Oklahoma City, has the contract for another test to be drilled for William H. Atkinson and Associates near the small Southwest Loco gas field, Stephens County, Oklahoma. It will be 2 Pace, in 11-3s-6w.

Helmerich & Payne, Inc., Tulsa, is starting a deep wildcat test for R. J. Caraway in Dawson County, in the northern part of the West Texas area. The test, 1 T. A. Loe, in Labor 12, League 12 Munger subdivision, Taylor CSL Survey, is contracted for 10,000 ft. and will explore the Penn-



Niel Nye (extreme right) is toolpusher for Shields Drilling Co., Wichita, contractor on a well recently completed in the Russell field, Russell County, western Kansas. With him are members of the drilling and casing crews after running the oil string. They are, left to right: Front row—Orval Mays, Ed Boxburger, Everett Bidwell, Flo Holt, and Ross Courtad. Back row—J. J. Harlan, C. B. Ryan, Ed Guest, and Grover Maxwell

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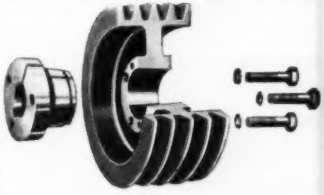

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sylvanian. The location is 5 miles south of the Welch field, which produces from the Permian.

E. K. Carey Drilling Co., Perry, Okla., is the contractor for Derby Oil Co. on a wildcat test, 1 Vanselous, being drilled in 27-25n-1e, southwest of the Southwest Ponca City pool, Kay County, Oklahoma.

Northern Development Co., Edmonton, is drilling for Redwater Leaseholds, Ltd., and Leduc Oils, Ltd., at their 1 Calmar-Stettler, a wildcat located in LSD 4, 1-39-20wrth, 5 miles north of the Stettler field, opened early this year by Canadian Gulf Oil Co. in central Alberta Province, Canada.

Ward & McCullough Drilling Co., Wichita Falls, Tex., is moving in rotary tools to drill B. F. Phillips, Jr., 1 H. Husfield, in Block 70, Hill CSL Survey, Montague County, North Texas. The location is a mile northwest of the Mueller field, about 4 miles east of Bowie. It is projected to 6,500 ft.

H. W. Pearson, contracting for Itawamba Association, is drilling a rank wildcat test in Itawamba County, northeastern Mississippi. The test, 1 Kilpatrick Mill Co., is in 14-10s-9e, 6 miles southeast of Fulton.

W. & M. Drilling Co., Dallas, is starting a second well for A. O. Phillips in the J. C. Robertson Survey, a mile northwest of Mount Sylvan, Smith County, East Texas. The new test, 1 Wellmaker, offsets the first, recently completed as a Paluxy sand oil discovery.

Martin Harris is the contractor on a wildcat test being drilled for M. A. Lawrence at 1 Supervisors, in 16-12n-3e, Yazoo County, Mississippi. Location is about 3 miles northeast of the Pickens field.

Suntex Drilling Co., Oklahoma City, is drilling a Pettit sand exploration test for Blackwell Oil & Gas Co. at 1-A Muslow, in 9-20n-15w, in the shallow Caddo-Pine Island field, Caddo Parish, northwestern Louisiana.

Davidson Drilling Co., Fort Worth, has the contract for Southern Minerals Corp. and Forest Oil Co. 1 R. V. Guthrie, a projected Ellenburger wildcat to be drilled in 26-31-1n, T&P Survey, 2 miles northwest of Coaoma, Howard County, West Texas.

Fred M. Manning, Inc., Denver and Fort Worth, has the contract for a 5,000-ft. wildcat test to be drilled for Stanolind Oil & Gas Co. on the latter's Stump lease in Block 1, BBB&C Survey, 6 miles south of Mankins, northwestern Archer County, North Texas.

T. & C. Drilling Co., Tulsa, will drill Toklan Royalty Corp. 1 Williamson, a Drinkard sand test on the northeast edge of the Drinkard field, Lea County, New Mexico. Location is in 23-21s-37e.

Big Chief Drilling Co., Oklahoma City, has contracted with Cities Service Oil Co. for a 10,500-ft. wildcat test (1 Board of Supervisors) to be drilled in 16-6n-16w, 3 miles north of Higgins, Jefferson Davis County, Mississippi.

O'Rourke-Baker Drilling Co., Tulsa, is the contractor and joint operator with W. J. Marten and Northern Ordnance Co. at 1 William DeWitt, a wildcat test being started in 27-20-4e, northern Payne County, Oklahoma. Hole is projected to the Wilcox horizon, expected around 4,100 ft.

George Puckett, Wewoka, Okla., is drilling for Finston & Co. at a wildcat test 4 miles northeast of the Paden pool, Okfuskee County, Oklahoma. The test, 1 Replogle, is projected to 3,700 ft. or the Cromwell sand. Location is in 31-13n-8e.

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Short Shaft	11.50 ea.
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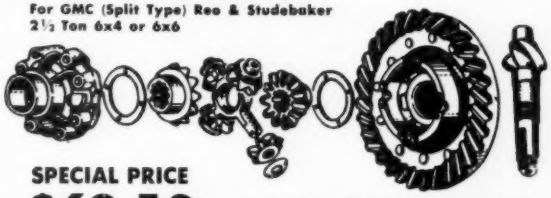

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Exploration and Drilling

New Developments in Electric Logging

IT is entirely too early to get any general reaction from geologists on the potential values and uses of the latest development in the field of electric logging, as announced at the Biloxi regional A.A.P.G. meeting last week. Most of the geologists at the meeting were entirely unprepared for claims of anything like the scope that was revealed.

Let's take a look at some of the practical problems for which the new method promises comparatively easy solutions. Getting reliable markers in thick shale sections, where you had no easy or simple fossil guide post, is going to be a big help in many places. But to be told you can have a whole sequence of them in any given well and in any given sequence of formations is much more. Then to be told that you can identify the sequence so definitely from well to well; that when a single one is cut out of the section by (1) faulting, (2) pinching out, (3) facies change, (4) or any other geological anomaly; that you can spot its disappearance immediately—that is really something.

Or, suppose you are working on a promising area in a thick Tertiary section. You've drilled one or more wildcats, and found staining, oil shows, and other evidence that if you could just locate a good sandy phase for a reservoir, you could expect a hit. They do say that with the new method you can tell when one of your markers is heading toward a facies change to a more sandy phase. If, in a given direction, the resistivity is increasing, keep going in that direction. If in a given direction the resistivity of your marker bed is decreasing, back up and go the other way.

Suppose you are drilling around a salt dome. You have a sequence established on one side, and start a test on the other side and run into evidence of faulting, as you usually do. With the fingerprints of your electrical resistivity they tell you that you can immediately pick up notice the first time a marker is faulted out, and tag it definitely.

The whole profession is on record as to the necessity of a sedimentology research program to get at certain fundamental problems. Now the claim is made that you can quickly get information on the sedimentary cycle from the log. You identify your shale sections as to whether they are deep-water deposits or brackish assemblages. Maybe you can tell where you are in a section that is ranging from a continental deposit to shallow, brackish water to deep water.

After all, the Gulf Coast experts spend a lot of time trying to pick the spot that is intermediate between the nonfossiliferous outcrop and the highly fossiliferous far-downdip phase. In between is where the oil-accumulation trends are found, in a sandy phase that makes a good reservoir.

Will the new method work in the Paleozoics? The answer given is that it should be easier to work there than in the Tertiary. In principle, so they claim, Miocene Tertiary along the Gulf Coast should be the toughest problem of all. Therefore, bring on your problems of correlation in the Pennsylvanian deep basins in Oklahoma, where sands shale out and widespread regional correlations are extremely difficult.

Is the vertical pattern of sequence identification upset by passing from one major geological division to another? They say it isn't; working from basal Tertiary down into Cretaceous, the geological dividing line doesn't upset the sequence identification. If that holds true generally, here is a powerful tool for those problems of deposition after a major unconformity. Onlaps, offlaps, overlaps, transgressing, regressing seas, and what happened along the truncated surface of an unconformity might be a lot easier to workout, with such a potent tool for identifying sequences.

So, it isn't much wonder that most of the geologists who heard the paper at Biloxi, simply refuse to commit themselves. If the new method is able to do half of what seem to be its potential jobs, it will be a very long step forward. Chances are, though, that it will be at least a year before we begin to get public reports from geologists as to what they were able to accomplish on specific geological problems with the aid of this new tool.

—Charles J. Deegan.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

TEXAS GULF COAST.—An Austin chalk oil discovery of unusual importance is reported in Wilson County. The W. R. Quin et al., 3 A. C. Oefinger flowed clean 34°-gravity, or better, oil at the rate of 400-500 bbl. per day through open 2-in. tubing at 2,832-2,953 ft. The pay zone was topped in the well at 2,840 ft. and the section was characterized as "fractured and porous" and saturated throughout. It is believed that this discovery might open a new trend of development in the Austin chalk and lead to other discoveries at similar depth near by.

ROCKY MOUNTAIN AREA.—The California Co. has made location for an important wildcat in the Gusher area between Roosevelt and Ashley Valley fields, Uintah County, Utah. The Texas Co. found water in the Madison and is now plugging back for tests in the Amsden at its apparent discovery in the Sumatra area, Rosebud County, Montana.

WEST TEXAS.—Early reports on Scurry County's latest Ellenburger discovery indicated it might make a good commercial well. Located 11 miles east of Snyder, C. L. Norsworthy, Jr., and others 1 D. D. Feldman, NE NE 63-3-H&TC, ran a 1-hour drill-stem test at 7,310-62 ft. Gas showed in 8 minutes, and after pulling 3,600 ft. of pipe the well started unloading, kicking oil over the derrick for several minutes. Recovery in the pipe was 150 ft. of mud cut with oil and 4,492 ft. of 44°-gravity oil. Bottom-hole flowing pressure was 700 psi. Top on the Ellenburger was tentatively placed at 7,310 ft., on an elevation of 2,357 ft. It was to drill deeper.

KANSAS

Harper County Debut In Oil Production Indicated

HARPER County may be getting its first commercial production in the testing by Drillers Gas Co. and associates of their 1 Grabs, NE NE NE 13-31-9. The well, located in the northwestern corner of the county, swabbed 1 bbl. of oil per hour in an initial test. Although indicated production is not large, the fact that oil is being found in a heretofore unproductive county, and in an area remote from production in any other county, is significant. Nearest production is the Whelan pool, more than 18 miles to the west and a little south in Barber County.

Production is from Mississipian, topped at 4,395 ft. (—2,757 ft.). Rotary hole was drilled to 4,400 ft. and 7-in. casing cemented at 4,397 ft. With cable tools moved in, plug was drilled out and hole deepened to 4,446 ft.

A new producing area 1½ miles southwest of the Klug pool and 2 miles west of the recently discovered McCauley pool, in Barton County, has been established by Stickle Drilling Co. at its 1 Rowland, NE NE SW 32-17-13. Producing from Arbuckle lime, topped at 3,321 ft. (—1,476 ft.), and with open hole at 3,323-47 ft., the well made 186 bbl. per day on pumping potential tests.

Another prospective pool is in the making in the area 5 miles northwest of Hays, Ellis County, where Virginia Drilling Co. 1 Schenck, NW NW NW 24-13-19, is preparing to test oil showings encountered in the Arbuckle, topped at 3,675 ft. (—1,633 ft.). Rotary hole was drilled to 3,679 ft. before running casing, cemented on top the pay. Standard tools are being set up for drilling in.

A half-mile northward extension for the Propp pool in Marion County is indicated at Slusser Drilling Co. and associates 1 Holub, SE SW SW 5-19-4e, where favorable oil showings were found in Mississippian topped at 2,360 ft. Hole was drilled only 2 ft. in and casing run 1 ft. off bottom.

KANSAS SUCCESSFUL WILDCATS

Ellis County: Appleman & Derby 1 Warren "A," NW NW NE 12-11s-20w, IP 390 bbl. of oil per day from Lansing at 3,458-65 ft., TD 3,800 ft.

McPherson County: Texas Pacific Coal & Oil Co. 1 Peterson, NW SW NE 17-18s-2w, IP 24 bbl. of oil per day from Simpson at 3,675-91 ft., TD 3,732 ft.

KANSAS WILDCAT FAILURES

Lyon County: George Johnston, Sr., and Stanolind Oil & Gas Co. 1 Wheat, NE NE SW 6-16s-12e, dry, TD 3,025 ft., Kansas City 1,340 ft., Marmaton 1,672 ft., Mississippian 2,230 ft., Kinderhook 2,586 ft., Hunton 2,733 ft., Maquoketa 2,816 ft., Viola 2,819 ft., Arbuckle 2,974 ft.

Wabaunsee County: Carter Oil Co. 1 Hankammer, SW SW SE 27-11s-10e, dry, TD 3,365 ft., Lansing 1,345 ft., Kansas City 1,474 ft., Mississippian 2,356 ft., Kinderhook 2,568 ft., Hunton 2,795 ft., St. Peter 3,259 ft., Arbuckle 3,354 ft.

Helmerich & Payne 1 Uhlrig, SE SE SW 8-11s-12e, dry, TD 3,227 ft., Lansing 1,105 ft., Kansas City 1,255 ft., Mississippian 2,264 ft., Kinderhook 2,396 ft., Hunton 2,605 ft., Maquoketa 2,876 ft., Viola 2,957 ft., Simpson 3,068 ft., Arbuckle 3,174 ft.

Carter Oil Co. 1 Dorgan, SW SW NE 6-15s-10e, dry, TD 3,446 ft., Howard 723 ft., Topeka 995 ft., Heebner 1,323 ft., Lansing 1,616 ft., Kansas City 1,762 ft., Mississippian 2,569 ft., Kinderhook 2,893 ft., Hunton 3,053 ft., Maquoketa 3,175 ft., Viola 3,257 ft., Arbuckle 3,423 ft.

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ROCKY MOUNTAIN

California Test Draws Attention to Uintah Basin

DENVER—Announcement of location by California Co. for a deep Tertiary test at its Gusher Unit has again attracted attention to production in the Uintah Basin of northeastern Utah. The well, 1 Unit, CSW SW 35-5s-19e, Uintah County, is on a 28,800-acre unitized block in this area. It is projected as a 9,000-ft. Tertiary test. Early this year Carter Oil Co. and Stanolind Oil & Gas Co. made an oil discovery at 1 Ute Tribal, CNW SW 21-1s-1e (U.S.M.), with the well producing from a zone in Tertiary between 9,357-92 ft. The well was completed flowing 1,633 bbl. of 32.6°-gravity oil in 24 hours. Since completion the well has flowed 600 bbl. of oil daily through 15/64-in. choke with oil-gas ratio at approximately 300 cu. ft. per barrel. Carter has pioneered developments in this basin since the first activity in the area 5 years ago. The company now reportedly has well in excess of 1,000,000 acres of land leased throughout this basin. The company is now drilling a deep Tertiary wildcat at its Strawberry Unit, NE NW SE 33-4s-11w (S.L.M.), with the well now below 1,128 ft. Carter drilled four expensive wildcat failures on its Vernal Unit, northeast of Gusher, prior to making discovery in the Roosevelt area. Eighteen miles northeast of California Co.'s Gusher location drilling operations are continuing in Utah's first oil field. There are now 16 Weber sand (Pennsylvanian) producing wells in the Ashley Valley field with four rigs drilling. Several good extension wells have recently been completed including one by Robert Six and Jimmy Stewart at 1 Hill, SW SW SW 24-5s-22e, which flowed 1,000 bbl. of oil in 28 hours. Plans are now in progress for a 6-in. pipe line from the Ashley Valley field to the Rangely field 40 miles southeast.

Attempted extensions to the Sussex pool, Johnson County, Wyoming, failed this week with completion by American Liberty Oil Co. of two wells. The 1 Meike, NE SE SE 18-42n-78w, a farmout from Sinclair Oil & Gas Co., was abandoned at 8,205 ft., total depth, after recovering water in the Lakota. On a Carter farmout at 1 Government, SE SE SE 27-42n-78w, American Liberty made water in Lakota. The company made location at 2 Government, SE NW NW 26-42n-78w, ¾ mile south of closest production. Continental Oil Co., operator of the Sussex Unit, is now completing extensions in the Lakota and Sussex in the field proper.

The Texas Co. is completing a wildcat discovery well in the Sumatra area at 6,006 ft., total depth. The well is 1 Northern Pacific, NE NE NE 5-9n-34e, and topped Madison at 5,940 ft. On drill-stem test 5,940-6,000 ft. the well made 5,600 ft. of sulfur water in 1 hour. This well recovered oil on drill-stem test in the Amsden between 4,389-4,414 ft. and the operators ran casing for further tests in this formation. The test is located northwest of the Ingomar structure and southeast of the Ragged Point field where production is from the Amsden.

WYOMING WILDCAT FAILURES

James Lake, Albany County: California Co. 1 George, SW SE NE 5-17n-75w, 6,584 ft. TD, plugged and aban., Frontier 3,557 ft., Muddy 4,353 ft., Dakota 4,510 ft. Lakota (?) 4,568 ft., Morrison 4,600 ft., Upper Sundance 4,958 ft., Lower Sundance 5,061 ft., Jelm 5,150 ft., Chugwater 5,320 ft., Forello 6,120 ft., Satanka 6,148 ft., Casper 6,426 ft., Tensleep 6,540 ft.

Sheep Mountain, Big Horn County: Sheep

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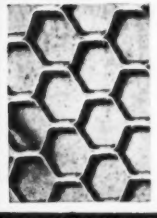

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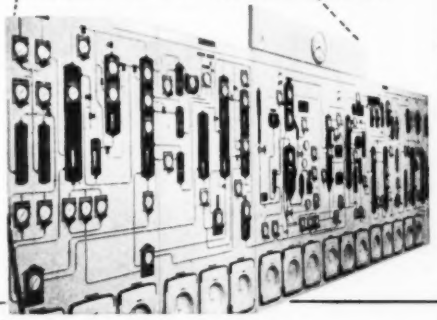

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COLORADO WILDCAT FAILURE

Coles Dome, Moffat County: Pitts-Colorado Oil 1-A William, SE SW NW 2-3n-92w, (Contr.: Fitzpatrick), 3,901 ft. TD, plug and abnd., Frontier 2,805-70 ft., show gas, Dakota 3,194 ft., Morrison 3,370 ft., Sundance 3,851 ft., water.

MONTANA WILDCAT FAILURES

Reagan Nose, Glacier County: Union Oil Co. of California 12 Tribal 194, SE NE NW 15-37n-7w, 6,258 ft. TD, PB 3,880 ft., flowed 65 bbl. oil per day, Madison 3,714 ft., Lodgepole 4,610 ft., Exshaw shale 4,870 ft., Devonian 4,880 ft., Three Forks 4,895 ft., Potlash 4,902 ft., Jefferson 5,135 ft., Cambrian 6,235 ft., failure in zones below Madison.

Corral Creek, Carter County: Amerada Petroleum Corp. 1 Unit, CNE NE 15-4s-57e, 5,310 ft. TD, plugged and abnd., Newcastle 2,930 ft., Dakota 3,295 ft., Morrison 3,632 ft., Spearfish 4,350 ft., Minnekahta 4,708 ft., Opeche 4,742 ft., Minnelusa 4,818 ft.

WESTERN NEBRASKA SUCCESSFUL WILDCAT

Cheyenne County: Ohio Oil Co. 1 Stueve, NE NW NW 12-15n-49w, pumped 250 bbl. of oil per day, TD 4,425 ft., elev. 4,215 ft. RB.

SOUTH DAKOTA WILDCAT FAILURES

Custer County: Palensky 1 Smith, SE SE SE 25-4s-7e, dry, TD 2,824 ft., elev. 3,391 ft.

Lamb 1 Coffing, C NW NW 34-6s-2e, dry, TD 400 ft.

Palensky 1 Streeter, SE NW NE 10-6s-6e, dry, TD 949 ft.

Lyman County: Red Butte 1 Burkhart, SW SE SE 6-104n-74w, TD 2,000 ft.

EASTERN TEXAS

Pewitt Ran Confirmation Well Looms Near Discovery

DALLAS.—The new Pewitt Ran pool in the Paluxy field 14 miles east of Talco in Titus County, had prospects of a confirmation well at Paul Pewitt's 1-A Pewitt fee, W. A. Dundas Survey, located 1,450 ft. southeast of the discovery.

The second well had top of the Paluxy at 4,544 ft., and was said to have shown good oil saturation to total depth at 4,568 ft. Casing was set on bottom without drill-stem testing and operators were waiting on cement at last report.

In Anderson County, Continental Oil Co. 1 Royall National Bank reported a flow of some gas and 3 bbl. of oil in 17 hours, following acid treatment of Pettit perforations at 9,624-9,709 ft. Break-down pressure was 4,000 psi. The holes were then squeezed.

The Rodessa section was perforated with 12 shots between 9,010-12 ft., and a drill-stem test at 9,005-12 ft., using ¼-in. chokes, produced a strong surface blow and recovered 450 ft. of brackish, muddy water. Perforations were squeezed with 100 sacks.

In Nacogdoches County, about 3 miles east of Linn Flatt, Humble Oil & Refining Co. 1-A Mrs. Mary R. Saner, new Travis Peak wildcat, logged top of the Austin chalk at 3,870 ft., and was drilling ahead below 5,045 ft. in lime and shale. Elevation was not reported. It is in the Chas. Holmes Survey, A-264.

Tide Water-Seaboard Oil Co. 1 C. K. Wade, John Henry Fields Survey, Upshur County Smackover wildcat, reported fine-grained sand, slightly porous, in side-wall cores at 7,844 ft. Log on the Massive anhydrite was 6,503-6,726 ft., Pettit 7,353 ft., and the Travis Peak at 7,510 ft., on elevation of 437 ft.

In Franklin County, completion was reported under way at Byars & Peveto 1-B Talley, SP Survey, in the new Lakeview Paluxy field southwest of Talco. Casing was perforated from 4,417-18 ft. Same operators 1 Horace Russell, same survey and 400 ft. east and slightly north of the 1-B Talley, was nearing the pay zone.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) SUCCESSFUL WILDCATS

Smith County: A. O. Phillips 1 E. G. Staples, 1 mi. NW Mt. Sylvan, 44.95-acre tract, J. C. Robertson Sur. A-853 and M. Culbertson Sur., 833 ft. from E and 150 ft. from S lines, Robertson Sur., TD 7,692 ft., elev. 560 ft., top Paluxy sand 7,559 ft., perf. 72 shots 7,556-68½ ft., 2-in. tubing 7,486 ft., IPF 309 309 bbl. 32.6°-grav. oil a day, ½-in. choke, GOR 145 cu. ft., TP 40 psi., SIP 525 psi.

Titus County: W. M. Coats 1 P. H. Pewitt, 14 mi. E Talco, 300 ft. from S, 5,200 ft. from E lines, Henry P. Banks Sur., TD 4,543 ft., elev. 289 ft., perf. 150 shots in Paluxy 4,507-32 ft., 24 shots 4,537-41 ft., top not reported, IPP 331.15 bbl. 18.6°-gravity oil a day, discovery of Pewitt Ranch field.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) WILDCAT FAILURES

Anderson County: Humble Oil & Refining Co. 1 J. J. Ellis, 4½ mi. S Frankston, 50-acre tract, A. W. Dunnegan Sur., dry, TD 6,035 ft., sample tops: Pecan 3,765 ft., Austin 4,927-5,113 ft.

Houston County: Oil Well Drilling Co. 1 George A. Beard, 25 mi. SW Crockett, 80-acre tract, John Durst Sur., A-29, dry, TD 8,594 ft., elev. 167 ft., drillers' top on Woodbine 8,040 ft.

TEXAS GULF COAST

Austin Chalk Discovery Reported in Wilson County

HOUSTON.—An Austin chalk oil discovery of unusual importance is reported in Wilson County. The W. R. Quin et al 3 A. C. Oefinger flowed clean 34°-gravity or better oil at the rate of 400 to 500 bbl. per day through open 2-in. tubing from open hole at 2,832-953 ft. Austin chalk was topped in the well at 2,840 ft., and the section at 2,832-2,953 ft. was acidized with 2,000 gal. of acid prior to the flow test. The chalk section was characterized as "fractured and porous" and saturated throughout. It is believed that this discovery might open a new trend of development in the Austin chalk and lead to other discoveries at similar depth nearby.

A new pay sand has been discoverd in the Placedo field of Victoria County with the completion of Barnsdall Oil Co. 1 Emil Kruppa. On initial test, the well flowed 165 bbl. of 28°-gravity oil daily through 9/64-in. choke with tubing pressure of 625 psi. and casing pressure of 900 psi. The well is located in the William Rupley Survey, Abstract 290.

Magnolia Petroleum Co. has run a drill-stem test on 1 Joe Vitek, Austin County wildcat, and recovered some low-gravity black oil. The first drill-stem test from 8,146-51 ft. recovered the 1,000 ft. water cushion and pressure built up to 3,600 psi. Tool was open for 15 hours and during that time some 21.4°-gravity oil was recovered. A second test at the same level recovered 30 ft. of water and 60 ft. of oil-cut mud with a bottom-hole flowing pressure of 1,930 psi.

Magnolia Petroleum Co. 1 Block 76 Unit, Live Oak County wildcat in Block 70, Simmons Subdivision, 10 miles southwest of George West, is drilling below 6,650 ft. after recovering distillate on drill-stem test. On 30-minute test at 6,478-89 ft., recovery was 60 ft. of distillate and pressure developed to 1,700 psi.

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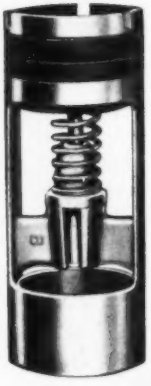

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TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Montgomery County: Gas discovery—Sterling Oil & Refining Co. & Daugherty & Kidd 1 W. Schiel, T. J. Stansbury Sur., A-485, 2 mi. NW of Tomball field, top sand 5,486 ft., TD 5,675 ft., perf. 5,486-91 ft., IP: 10,400 M.c.f. gas per day open flow, SIP 200 psi.

Polk County: New pay at Copeland Creek—A. O. Phillips 1 Roger W. Armitage, Augustine Viesoa Sur., top sand 3,334 ft., TD 3,352 ft., perf. 3,338-44 ft., IP: 117 bbl. oil per day, 1/8-in. choke, GOR 445, TP 575 psi., CP 650 psi., 27° grav.

Victoria County: New pay at Placedo—Barnsdall Oil Co. 1 Emil Kruppa, Wm. Rupley Sur., A-290, top sand 5,696 ft., TD 6,066 ft., perf. 5,696-700 ft., IP: 164 bbl. oil per day, 9/64-in. choke, GOR 521, TP 625 psi., CP 900 psi., 28° grav.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Austin County: H. E. Williams et al 1 A. E. & C. F. Mewis, Jas. P. Stephenson Sur., 3½ mi. E of Bellville, dry, TD 8,400 ft.

Bee County: H. E. Dirks, Bill P. Wood and Falco Oil Well Service Co. 1 James F. Power, Morgan O'Brien Sur., 10 mi. NW of Beeville, dry, TD 3,556 ft.

Colorado County: Casey & Weempe 1 John R. McLane, I&GN RR Sur., 43, A-294, 10 mi. SW of Garwood, dry, TD 4,600 ft.

Fayette County: Chicago Oil Corp., Baldridge & King & Sohio Petroleum 1 E. A. Arnim, Jacob Stiffler Sur., 2 mi. N of Arnim field, dry, TD 5,168 ft.

Fort Bend County: Jack W. Frazier & W. A. Brill 1 J. F. Winston, Wm. Morton Sur., A-62, 4 mi. N of Richmond, dry, TD 8,066 ft.

Hardin County: McCarthy Oil & Gas Corp. 1 Mrs. J. W. Parker et al, Hy. Stephenson Sur., Block 62, dry, TD 5,879 ft.

Harris County: H. E. Williams & Wm. S. Thompson 1 A. B. Rohrer, T. Hogan Sur., A-326, 2 mi. NW of Fairbanks and 1 mi. E of Satsuma field, dry, TD 7,710 ft.

Jefferson County: Meredith, Clegg & Hunt et al 1 W. F. McDermond, T&NO RR Sur. 67, 10 mi. NW of Winnie, dry, TD 8,662 ft.

Victoria County: Paul J. Fly & R. E. Cliburn et al 1 Morris, Leopard & Rose, Juan Flores League, A-29, 13 mi. SW of Victoria, dry, TD 5,616 ft.

P. R. Rutherford 1 C. K. McCan et al, John Smalley Sur., A-293, 8½ mi. N of Victoria, dry, TD 4,010 ft.

Wharton County: Prince Drilling Co., Inc., et al 1 C. T. Kountze & Stewart, Morris & Cummings Sur. 31, 6 mi. SE of Louise, dry, TD 5,800 ft.

SOUTH LOUISIANA

Testing Continues at Magnolia Offshore Well

NEW ORLEANS.—Testing operations are still under way at Magnolia Petroleum Co. A-2 State Lease 766, Block 72, Ship Shoal area, offshore from Terrebonne Parish. After squeezing off perforations from 6,990-96 ft., operators have now perforated a section from 6,994-97 ft. and are testing this section. The test has had a showing of gas and pipe line oil, with a high gas-oil ratio.

Union Producing Co. and M. H. Marr have run 7-in. casing to 9,801 ft. in their 1 Hudson, Rapides Parish wildcat test 1 mile north of Big Island production. Cores from 10,192-223 ft. recovered 19 ft. of hard black shale and shaly lime. Hole is bottomed at 10,223 ft. and operators have run log and taken sidewall cores.

A 7,300-ft. southwest extension test to the Welsh field, Jefferson Davis Parish, has been staked by Stanolind Oil & Gas Co. Test is to be the 1-A Ervine & Bishop and is located in the southeast quarter of Section 21-9s-5w.

The Mallard Bay area of Cameron Parish is headed for extensive development with announcement of five new locations by Mar-Tex Realization Corp. and DeGolyer & MacNaughton and Murrell. The fluid was opened last April with the 1 Andrew White, 13-14s-15w, drilled by Cecil Hagen, to a total depth of 10,642 ft., and completed through perforations at 6,712-20 and 6,729-33 ft. However, oil sands were found at 6,740, 9,070, 6,690, 9,970, 10,065, and 10,390 ft. and indicated oil saturation.

In Pointe Coupee Parish, Bennett Brothers have plugged and abandoned the 1 L. K. Nicholson, wildcat in Section 110-6s-9e, at total depth of 10,200 ft. The wildcat was previously reported to have several oil shows, but electric log run on the well failed to confirm any oil show whatever.

Humble Oil & Refining Co. has spudded the confirmation test for the Avondale field discovery. The new test, 1 Marrero Land & Development Association, Ltd., has 13⅜-in. casing set at 1,787 ft. and operators are waiting on cement with total depth of 1,850 ft.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Plaquemines Parish: New gas-condensate discovery—Gulf Refining Co. 2 State "QQ" Black Bay, offshore, top sand 10,095 ft., perf. 10,095-102 ft., TD 10,212 ft., IP: 86 bbl. condensate per day, plus 5,400,000 cu. ft. gas per day, ¼-in. choke, TP 3,535 psi., 54.2° grav.

MISSISSIPPI

Stanolind Well Completed As Russum Field Discovery

JACKSON.—Final completion has been made on the Stanolind Oil & Gas Co. 1 J. B. Dockery, discovery well for the Rassum field, Jefferson County. The well is producing 35 bbl. of oil daily on pump, with casing pressure gradually increasing.

Activity in the Bude field, Franklin County, has been renewed since completion of California Co. 1 J. W. Bass Unit, 19-5n-4e, which flowed 604 bbl. of oil daily. Southeastern Drilling Co. has announced location of its 1 Knott, 19-6n-4e, and is negotiating for a second farmout in the field. Pan American Production Co. is expected to begin development of its close-in acreage and Barnsdall Oil Co. has staked location for the 2 J. Pittman, 29-5n-4e.

Reperforating and testing is under way at the Red Wing Drilling Co. 1 Torry Smith, 32-10n-11w. The potential new gas-distillate field is 6 miles north of Laurel. On drill-stem test the well flowed some gas and a large amount of salt water from 5,505-40 ft.

Humble Oil & Refining Co. continues to increase its drilling activity in Adams County. Permit has been secured to drill the 1 Mrs. Roane F. Byrnes, 13-5n-3w, 2½ miles northwest of the Armstrong-Ellislie field. The new wildcat venture is projected to 12,000 ft.

In Covington County, Helmerich & Payne, Inc., is drilling below 8,880 ft. at the 1 L. S. Massengale with no shows.

L. M. Lockhart is drilling below 10,580 ft. in his wildcat try, the 1 U. S. A., 44-6n-2e, Franklin County.

Three miles west of the one-well Sand Hill pool, Green County, Humble is drilling below 8,100 ft. at the 1 O. B. Bowen et al. Approximately 3 miles southeast of the Sand Hill pool, Don Reese is drilling below 4,300 ft. at his closely watched wildcat, the 2 I. R. Anderson, 23-4n-8w.

MISSISSIPPI SUCCESSFUL WILDCAT

Jefferson County: Oil discovery, Russum field—Stanolind Oil & Gas Co. 1 J. B. Dockery, 17-10n-2e, top sand 9,768 ft., TD 9,952 ft., perf. 9,768-75 ft., IP: 35 bbl. per day on pump, CP 1,255 psi.

MISSISSIPPI WILDCAT FAILURE

George County: Hassie Hunt Trust 1 H. C. McLain, 3-2s-7w, dry, TD 8,507 ft.

OKLAHOMA

Garfield County Wildcat Opens New Wilcox Pool

WHAT appears to be another important oil discovery has been made by A. G. Oliphant in his 1 Hoover, NE SW SE 2-24n-5w, northeastern Garfield County. In a drill-stem test of Wilcox sand at 6,167-6,218 ft., the well showed gas within 5 minutes after the tester was opened and started flowing oil in 40 minutes. The tool was open 65 minutes, and in that time flow was estimated at the rate of 20 bbl. per hour. Following the test, 450 ft. of clean 44° oil and 10 ft. of oil-cut mud was recovered. Flowing pressure was 900 psi, and shut-in pressure 2,650 psi. Casing has been run to 6,203 ft., 15 ft. off bottom.

The location is about ¾ mile south of the Grant County line and about 6 miles south of the Rich Valley pool, in the latter county, and opened early this year as another important discovery from the same horizon. It is about 3 miles northwest of Hunter and about 5 miles north of the Southwest Hunter pool, nearest production. The Olinhant discovery has been designated as the Northwest Hunter pool.

Another new pool also is believed to have been found in McClain County where Sinclair Oil & Gas Co. got good oil recoveries in drill-stem tests from Bromide at its 1 Williams, C NE SW 18-5n-2w. First Bromide was topped at 2,373 ft. First test, made at 8,362-83 ft. with tool open 90 minutes, gave a recovery of 210 ft. of clean 30°-gravity oil and 60 ft. of oil and gas-cut mud. Second test, taking in an interval at 8,372-8,409 ft., got a recovery of 160 ft. of clean 37°-gravity oil and 60 ft. of oil and gas-cut mud. Shut-in pressure built up to 2,150 psi. A third test, made at 8,537-45 ft., yielded 220 ft. of oil-cut mud. Operators are drilling ahead. Location is 5 miles east of Payne and about 3 miles west of the Southwest Moore pool.

J. E. Crosbie, Inc., 1 Cosgrove, NE NW SW 1-11n-7e, 2 miles northwest of the Rusk pool in western Okfuskee County, is showing for a new Hunton lime discovery. Hunton was topped at 4,235 ft. In a drill-stem test at 4,239-59 ft., gas showed in 4 minutes and during the test, lasting 60 minutes, the well flowed 61 bbl. of oil. Flow continued 15 minutes after the tool was closed. Recovery was 350 bbl. of clean 43°-gravity oil. Casing has been cemented on top the pay.

OKLAHOMA SUCCESSFUL WILDCATS

Hughes County: Coronado & Bradshaw 1 Stephenson, NE NE NW 15-6n-9e, pumped 32 bbl. of 35°-gravity oil per day from Booch at 2,800-19 ft., TD 5,449 ft.

Okfuskee County: New pool, "Northeast Valley Grove"—Armer & Cullinan Petroleum Co. 1 Seran, SW NE SW 30-13n-9e, pumped 30 bbl. of 37°-gravity oil per day from Dutcher at 3,420-60 ft.; Checkerboard 1,077 ft., Oswego 2,004 ft., Prue 2,034 ft., Verdigris 2,200 ft., Senora lime 2,336 ft., Inola 2,814 ft., Bartlesville 2,844 ft., Booch 3,175 ft., Wapanucka 3,448 ft., Cromwell 3,485 ft., Mississippian Caney 3,545 ft., TD 4,120 ft.

Oklahoma County: An-Son Petroleum Co. 2 McVickers, C NW NW 7-12n-1w, flowed 40 bbl. of oil per day through ¾-in. tubing choke from Bartlesville at 6,045-61 ft., TD.

Stephens County: Arkinson 2 Patty, NE NW SE 27-2s-6w, pumped 21 bbl. of 38°-gravity oil per day from sand at 1,830-77 ft., TD 2,803 ft.

OKLAHOMA WILDCAT FAILURES

Cotton County: Richardson 1 Dilks, W/2 NE SE 27-3s-11w, dry, TD 1,550 ft., conglomerate 1,214 ft., sand 1,321 ft. and 1,533 ft.

Grant County: Aurora Gas et al 1 Searl, NW NW SE 23-27n-4w, dry, TD 5,465 ft., Tonkawa sand 3,515 ft., Layton 3,943 ft., Hogshooter 4,092 ft., Checkerboard 4,260 ft., Big lime 4,373 ft., Mississippi chat 4,860 ft., Mississippi lime 4,895 ft., Woodford 5,324 ft., dolomite 5,380 ft., Wilcox 5,428 ft.

Hughes County: Mid-Continent 2 Peggy Goat, NW SW NE 25-7n-8e, dry, TD 1,001 ft.

Jefferson County: Pierce 1 Kennedy, SE SW SE 25-5s-9w, dry, TD 2,510 ft., sand 1,586 ft. and 1,594 ft.

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Kiowa County: Siler 1 Everhart, SE NE NE 35-7n-20w, dry, TD 1,212 ft.

Okfuskee County: Mid-Continent 1 Ballinger, NW SE SE 7-11n-11e, dry, TD 3,895 ft.

Payne County: Tomany & Murta 1 Laughlin, SE SW SW 31-19n-5e, dry, TD 3,309 ft., shale 2,635 ft., Checkerboard 2,765 ft., Peru 3,106 ft., Big lime 3,125 ft., Oswego 3,170 ft., Prue 3,250 ft.

Stephens County: Stewart 1 Woodard, SW SW NE 29-2s-6w, dry, TD 2,626 ft., Arbuckle 2,613 ft.

Stewart 2 Woodard, SW SW NE 29-2s-6w, dry, TD 1,264 ft., sand 1,259 ft.

LA.-ARK.

Ohio Gulf Well Runs Drill-Stem Test in Stray

SHREVEPORT.—Ohio Oil Co. and Gulf Refining Co. 1 O. L. Martin, 3-22n-7w, Claiborne Parish, ran a 45-minute drill-stem test at 9,075-9,171 ft., in the Stray sand of the Cotton Valley formation, using ¼-in. chokes and 3,000 ft. of water cushion; recovery was the water cushion plus 365 ft. of oil, with no salt water.

A second test from 9,201-9,320 ft., identified as in the Taylor section, using the same amount of water and same size chokes, recovered the water cushion and 275 ft. of gas-cut mud in 38 minutes. Bottom-hole flowing pressure was 1,300 psi. Drilling continued below 9,230 ft.

In Bossier Parish, Gulf Refining Co. 1 R. Z. Biedenharn, 23-21n-14w, Paluxy test in the Cottage Grove area, had drilling under way below 1,620 ft. A core at 1,000-20 ft. recovered 2 ft. of shale, 4 ft. of sand with oil show, and 3 ft. of oil sand, then 1 ft. of lime and 1 ft. of sand with light show. A drill-stem test from 1,006-20 ft., identified as Nacatoch sand, recovered 155 ft. of oil and gas-cut mud in 30 minutes. Maximum tubing pressure was 5 psi.

Three miles southeast of Bossier City field, John F. Magale 1 J. H. Walker, NE NW 14-17n-13w, new Travis Peak exploration, was drilling in the upper Glen Rose at 3,775 ft.

Three miles east of Rocky Mount, C. H. Murphy 1 Crystal Oil & Refining Co., 14-21n-12w, was still in the Travis Peak at 8,338 ft. Contract depth was 9,000 ft.

In the Sligo field of Bossier Parish, Union Producting Co. 1 Section 13, 13-17n-12w, placed top on the Bodcaw section at 8,101 ft., by core, on an elevation of 214 ft. Coring continued below 8,502 ft., in the Cotton Valley. Recovery from 8,300-8,443 ft. was sand, shale and siltstone, with no shows.

In the Greenwood gas area of Caddo Parish, Plymouth Oil Co. 1 Thigpen-Herold, 12-17n-16w, set surface casing at 2,029 ft., and was drilling ahead below 3,735 ft., in upper Glen Rose. It is on a Travis Peak contract.

Gulf Refining Co. 1 M. M. Kinnebrew, NE NE 26-20n-7w, deep exploration in the Athens field, Claiborne Parish, was fishing at 6,041 ft., in the lower Glen Rose. Electric log tops were: Lower Cretaceous 3,901 ft., Massive anhydrite from 4,652-4,912 ft., Eelevation is 343 ft.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: Miers & Sklar 1 J. A. Edwards, SE NE NE 12-19n-12w, dry, TD 2,669 ft., elev. 236 ft., Nacatoch 716 ft., Saratoga 1,118 ft., base Annona 1,428 ft., Tokio 1,636 ft., Tuscaloosa 2,284 ft.

Sabine Parish: T. F. Baker 1 Sabine Lumber Co., 26-9n-12w, dry, TD 2,488 ft.

Union Parish: C. M. Bagley B-1 Frost Lumber Co., NE SE NW 28-23n-1w, dry, TD 2,306 ft.

ARKANSAS WILDCAT FAILURE

Ouachita County: C. G. Davis 1 E. L. Autrey, SE NE NE 32-14s-19w, dry, TD 3,665 ft., Midway 769 ft., Nacatoch 1,372 ft., base Annona 1,933 ft., James 2,736 ft., Hogg section 2,910 ft.

SOUTHWEST TEXAS

Weigang Field Extended By H. R. Smith Well

CORPUS CHRISTI.—H. R. Smith has completed the 1 Gus Stolle for an extension well to the Weigang field, Atascosa County. On initial test the well flowed 72 bbl. of 23.2°-gravity oil daily through 10/64-in. choke with 120 psi. pressure on the tubing. Total depth of the well is 3,930 ft., and production is through perforations at 3,921-25 ft. The extension is located in the T. G. Butler Casey Pasture Subdivision of the J. Clifton Survey 139.

A new gas discovery for Starr County is The Texas Co. 3 Samuel D. Bloomberg et al, located in Xavier Zamora Porcion 41, Abstract 77. Casing was perforated from 4,030-48 ft. and through a 3/16-in. choke the well flowed 1,755 M.c.f. gas per day with 1,545 psi. working pressure.

Magnolia Petroleum Co. 1 Weil, Survey 131, Duval County, promises to open a shallow oil pool 9 miles southwest of Freer and 1½ miles east of Cedro Hill field. A drill-stem test was run from 1,544-58 ft. and in 12 minutes the well recovered 10 ft. of gas-cut mud and developed 380 psi. pressure. Sand with oil odor was found from 1,552-63 ft. Operators ran another drill-stem test from 1,560-65 ft. and are now testing through a ⅜-in. and ¼-in. choke.

Humble Oil & Refining Co. 2 R. J. Kleberg, Jr., Trustee, Brooks County wildcat, recovered 80 ft. of 50°-gravity distillate and 10 ft. of mud on drill-stem test at 8,041-56 ft. and developed 400 psi. working pressure. Operators squeezed perforations and are preparing to run another test at 8,068-80 ft.

Southwestern Oil Development Co. recovered 13 stands of gas-cut mud and a little free oil after running a drill-stem test from 1,742-72 ft. in the 1 Rafael Canales. Total depth of the well is 1,936 ft. and the top of the pay is 1,739 ft. The wildcat is located in Tract 7, Share 2-B, La Sacatosa Grant, 1 miles southwest of the Sacatosa field, Starr County.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Duval County: New oil pool—Gasoline Production Corp., Ralph Rowden & Dale H. Rowden 1 John P. Akin-State of Texas, F. E. Stearns Sur. 184, 11½ mi. SW of Freer, top sand 2,155 ft., TD 2,806 ft., perf. 2,155-63 ft., IP: 60 bbl. oil per day on pump, grav. 25°.

Starr County: Oil discovery—Continental Oil Co. G-3 T. B. Slick Est., Sur. 541, top sand 5,157 ft., TD 5,298 ft., perf. 5,175-62 ft., IP: 34 bbl. oil per day, 12/64-in. choke, TP 920 psi., CP 1,080 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: Geo. W. Graham & Ryan, Hays & Burke 1 D. W. Grant, D. C. Barnett Sur., A-321, 8½ mi. N-NE of Gregory, dry, TD 9,525 ft.

Atascosa County: Newman Bros. and E. W. Gill 1 Campbell, V. Hefferman Sur., A-392, 2 mi. N of Weigang field, dry, TD 6,006 ft.

Bastrop County: Ben D. Clower 1 Robinson, Elizabeth Standifer Sur. 24, 3 mi. S of Elgin, dry, TD 2,544 ft.

Duval County: Bridwell Oil Co. 3 A. G. Villarreal, San Andres Grant, A-657, 5 mi. E-SE of Benavides, dry, TD 4,341 ft.

Jim Wells County: Long Bros. Drilling Co. 1 A. G. Mendoza, Taylor Creek Irrig. Co. Sur., 10½ mi. S of San Diego, dry, TD 4,603 ft.

Maverick County: W. C. Estes 1 Paul Jackson, Edison-Estrada Subdivision, Block

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13, 12 mi. NW of Eagle Pass, dry, TD 2,510 ft.

McMullen County: Producers Corp. of Nevada & J. E. Hillier 1 Duwell Corp., A. Morin Sur. 40, A-1189, 5 mi. SW of Clegg, dry, TD 3,567 ft.

Medina County: J. White 1 E. H. Bendele, Marie Inken Sur., 7 mi. SW Castroville, dry, TD 1,639 ft.

San Patricio County: Great Lakes Carbon Corp. 1 John J. Welder, Sec. 84, Geo. H. Paul Subdivision of Welder Ranch, dry, TD 6,016 ft.

Webb County: Daubert-Achning 1 R. V. Benavides, Block 9, Sec. 13, M. Arispe Grant, 2 mi. NE of Bruni, dry, TD 3,314 ft.

Killam & Hurd, Inc., 4 Bruni Est., Sur. 128, 5 mi. SW of Bruni, 1 mi. N of Quien Sabe field, dry, TD 2,717 ft.

APPALACHIAN FIELD

Another Good Gas Well Added to Pennsylvania Field

PITTSBURGH. — West Bethlehem Township, Washington County, Pennsylvania, accounted for another good gas well, the Manufacturers Light & Heat Co. 1 Floyd B. Longstreth, which gaged 2,251,000 cu. ft. The Fifty-Ft. sand was topped at 2,803 ft., gas 2,848-52 ft., fifth sand 3,077 ft., gas 3,095-96 ft. and 3,105-10 ft., total depth 3,112 ft. In Georges Township, Fayette County, Orville Eberly et al 1 N. E. Murphy, elevation 2,560 ft., is drilling at 4,653 ft. In Napier Township, Bedford County, South Penn et al, Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., is drilling at 5,037 ft.

In Elk district, Kanawha County, West Virginia, Hoover Oil & Gas Co. 1 Mary Hoover found Corniferous lime at 4,930-5,057 ft. and Oriskany sand at 5,057 ft. resulted in a small show of gas and a hole full of salt water at 5,061 ft., and will be plugged. Total depth is 5,079 ft. In Pocatalico district, Putnam County, Godfrey L. Cabot, Inc., 41-1304 J. L. McLean heirs, is drilling in the Oriskany sand at 4,769 ft., or 6 ft. in, with a show of gas. In New Interest district, Randolph County, South Penn Oil Co. 1 J. W. Isner resumed drilling after overcoming a bad hole at 6,020 ft. It is now at a depth of 6,097 ft. where a fishing job was encountered. Efforts are being made to remove the bailer from the hole.

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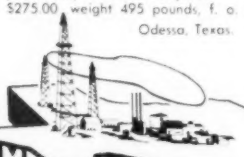

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CALIFORNIA

Extensions to Two Fields Spur Cuyama Valley Play

LOS ANGELES.—The Russell Ranch and South Cuyama fields both came in for extensions this week, increasing the Cuyama Valley play.

F. C. Griggs & Associates completed the 3 Norris-Cuyama, 25-11n-28w, in the White Rock section of the Russell Ranch pool. The well is flowing 27 bbl. of 28°-gravity oil per day through a 13 64-in. bean from the Diblee sand at a plugged-back depth of 3,420 ft. Original depth was 4,115 ft.

Richfield Oil Corp. completed its 65-26 Machader, 26-10n-27w, one location northwest of present South Cuyama production. Flow is estimated at 1,317 bbl. of 31.3°-gravity oil per day. Total depth is 4,570 ft. with production from 4,325-4,483 ft.

About 1 mile south of the South Cuyama field, Bell Petroleum Co. is reaching a critical stage at the 21-1 Johnston test. The oil sand has been topped at 4,369 ft. The company has also staked location for the 11-1 Johnston as a southerly offset to its 18-36 Hibbard well.

Wilshire Oil Co. has spudded in its first Cuyama Valley try. The well is the 54-6 U. S., 6-9n-26w, in the "Bell Extension area."

Ring Oil Co.'s completion of the 2 Wilke, 21-30n-29w, for 140 bbl. of oil has added to the interest in the Edison area. One of the latest starts here is Degener Petroleum Co. 1 Degener, now drilling at 1,500 ft.

After being idle for some time, Independent Exploration Co. is again drilling in its Carrizo Plains wildcat, 33-36 Tembler-Rexroth. Located in Section 36-28n-18w, the test is now below 4,400 ft.

East of Calder in Kern County, General Petroleum's wildcat, 74-24 Calder-KCL, was coring hard gray sand below 11,803 ft. The well is located in 24-29s-25e. To the southwest (26-29s-25e), the company's 61-26 Sturdevant is drilling hard shale at 6,728 ft.

Trico Oil & Gas Co. brought in its 2 Crocker estate, 6-25n-24w, for 5,000,000 cu. ft. of gas per day. Productive interval was found at 3,250-55 ft. in the Atwell Island zone.

CALIFORNIA WILDCAT FAILURES

Fresno County, Jacalitos area: The Texas Co. 1 Raaths, 30-21s-16e, dry, TD 6,768 ft., elev. 1,008 ft.

Kern County, Canal area: Shell Oil Co. 37-4 KCL-A, 4-30s-25e, dry, TD 10,769 ft. redrilled to 9,024 ft.), elev. 320 ft.

South Edison area: Havenstrite Oil Co. 1 Community, 35-30s-29e, dry, Schist 3,355 ft., TD 3,360 ft., elev. 547 ft.

Tejon Hills area: S & M Oil Co. 1 S & M, 2-11n-18w, dry, soft granite 700 ft., hard granite 732 ft., TD 750 ft., elev. 1,307 ft.

Los Angeles County, Placerita area: B. F. De Lanty 1 Nadeau, 28-4n-15w, dry, TD 1,529 ft., elev. 1,500 ft.

San Luis Obispo County, Carrizo Plains area: Elmer C. Von Glahn 1 Soda Lake,

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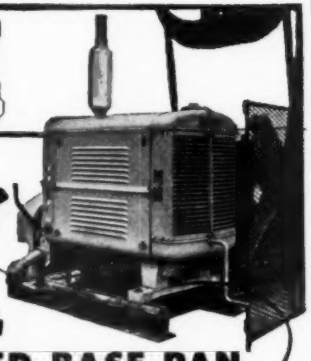

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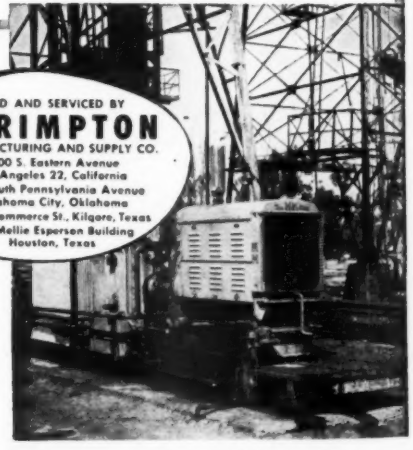

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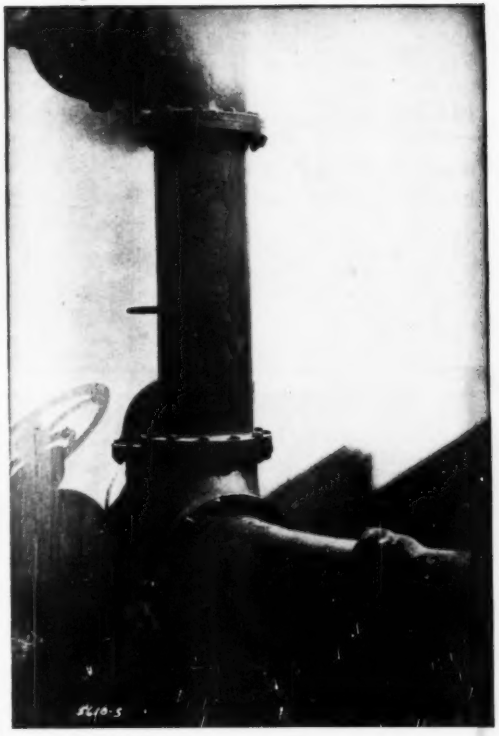

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12-31s-19e, dry, TD 2,575 ft., elev. unknown.

Arroyo Grande area: C. W. Colgrove 45-33 Patchett, 33-31s-13e, dry, TD 4,699 ft. in basement, elev. 283 ft.

MICHIGAN

North Buckeye Pool to Get Important Deep Test

MOUNT PLEASANT—Mogul Oil Co. (J. V. Wicklund) will start a 5,100-5,200-ft. Richfield zone test in the heart of North Buckeye Dundee oil pool, Gladwin County, within the next 2 weeks. This is the first test to be drilled to the deeper horizon in the field.

Wicklund discovered North Buckeye in 1939. Negotiations have been in progress with other oil companies with producing leases in the field for several weeks. Final arrangements have been completed with Sun Oil Co., largest producer in the field, and Sun is supporting the deeper zone test with bottom-hole commitment. Other operators, including Basin Oil Co., C. W. Collin, Leonard-Rowmor interests, Socony-Vacuum Oil Co., Rex Oil & Gas Co., Daily Crude Oil Co., Smith Petroleum Co., and Mammoth Producing Corp., are supporting the test with cash contributions, or are farming the deep rights to Wicklund on an override basis. The new test is being considered as one of the most important deeper drilling projects to be started in Michigan this year.

A new Traverse oil discovery was finished this week by Norman L. Stevens in Geneva Township, Van Buren County. Stevens' 1 Funk, SE SE NW 27-1s-16w, was rated good for 50 bbl. of oil a day after acid at 1,045 ft., total depth. Traverse lime top was logged at 1,042 ft.

Deepening operations, scheduled to carry the well to the Dundee were started on Don Rayburn 2 Cooper-Lucht, NE SW NE 29-17n-4e, Pinconning Township wildcat, Bay County, which had previously been completed in the Traverse as a discovery. Water started showing in quantities as high as from 6 to 10 per cent after approximately 1,600 bbl. of oil had been produced from the Traverse pay zone.

MICHIGAN SUCCESSSFUL WILDCAT

Van Buren County, Geneva Township: Norman L. Stevens 1 Funk, SE SE NW 27-1s-16w, Traverse 1,042 ft., 50 bbl., TD 1,045 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Casco Township: Maury Roberts 1 Schneller, SW NE SW 1-1n-16w, Traverse 1,176 ft., dry, TD 1,182 ft.

Ganges Township: Louis Zellman 1 James, SW NW SW 27-2n-16w, Traverse 1,227 ft., dry, TD 1,233 ft.

Lee Township: Norman L. Stevens 1 Sommers, SE NW SE 20-1n-15w, Traverse 1,169 ft., dry, TD 1,174 ft.

Saugatuck Township: D. B. K. Van Raalte 1 Triolo-Millar Comm., NW NE SE 23-3n-16w, Traverse 1,317 ft., dry, TD 1,326 ft.

Mason County, Custer Township: Fisher-McCall Oil & Gas, Inc., 1 Johnson, SW SW NE 11-18n-16w, Dundee 2,407 ft., dry, TD 2,412 ft.

Van Buren County, Columbia Township: Oil Producers, Inc., 1 Hopkins, SE NE SW 4-1s-15w, Traverse 1,161 ft., dry, TD 1,194 ft.

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CANADIAN FIELDS

Another Drill-Stem Test Run at Imperial's Simmons

CALGARY—Imperial Oil, Ltd., 1 Simmons, LSD 1, 25-56-21w4, indicated southeast extension to the Redwater oil field, ran another drill-stem test in D3 zone of Devonian. The 45-minute test at the 3,161-87-ft. interval gave a recovery of 2,547 ft. of gassified oil. Previous 1-hour test from 3,132-58 ft. yielded 2,880 ft. of gassified oil in the pipe. Coring is now proceeding at 3,197 ft. First test at Simmons that showed oil was run at total depth 3,112 ft.

Indicated D3 zone now open below casing level is 107 ft., and 7-in. casing was set at 3,090 ft. If the water line at Simmons corresponds to that in the Redwater field the well could have up to 191 ft. of D3 zone above the water level.

Imperial 1 Normandville, LSD 1, 16-79-22w5, indicated Devonian oil discovery well 30 miles south of Peace River town in northwest Alberta, was kicked off. At last report the well's output was still being turned through the flare line, and as soon as the formation has been cleared of drilling fluid, the well will be turned into separator and a test of oil potential made.

During the week 11 wells were completed in Alberta, including 5 field-development wells and 6 wildcats. Of these, four of the field wells were placed on production and one abandoned, while all six exploratory tests were abandoned. Ten new wells commenced drilling, including five at Redwater, two at Leduc-Woodbend, one extension test at Campbell, and two exploratory tests.

Three of the new oil wells were at Redwater and one was at Woodbend. Imperial owns one of the new producers, thus raising its total number of successful completions in the Redwater field to 57. Amerada Petroleum Corp. obtained one substantial well at Redwater, while the other one in this field belongs to the British American Oil Co., Ltd., that now has two wholly owned wells on its acreage. The Anglo Canadian-Home Oil Co.-Calgary & Edmonton Corp. team placed its eighth oil well on production in Woodbend Township this week. An additional 16 wells are nearing completion, half of which will likely run

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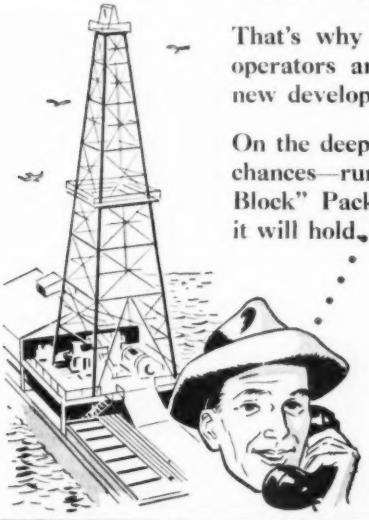

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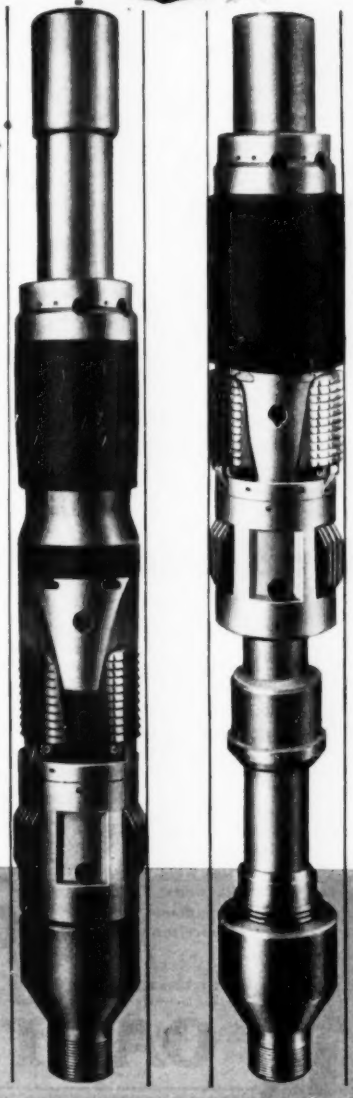

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production tests over the week end, and the other half will probably go on steady flow during the coming week. The field abandonment was Western Leaseholds' fourtieth completion at Redwater, the other 39 having been successful wells.

Among the companies starting further rigs at work this week are: Imperial, with two new drillers at Redwater; Amerada, with one at Redwater; the Dalhousie-Western Leaseholds team, one at Redwater; Calvan Petroleums-Pacific team, another at Redwater; Ross Petroleum, one at Leduc; and Home-Anglo-C. & E. team, one at Woodbend. In addition to the field wells, Socony-Vacuum Oil Co., Ltd., is starting a wildcat at Verdant Valley, Canadian Gulf at Tawatinaw; and Highcrest Petroleums has staked its initial well ¼ mile south of the Campbell discovery well, a few miles northeast of Edmonton.

CANADIAN WILDCAT FAILURES

Imperial Oil Co., Ltd., 1 Ireton, LSD 4, 10-49-26w4, dry, TD 6,373 ft.; Imperial Oil, Ltd., Nestow, LSD 9, 13-60-26w4, dry, TD 3,740 ft.; British-American-Union-St. Paul 1, LSD 5, 34-56-9w4, TD 3,803 ft.; Pan Western-West Edmonton 2, LSD 9, 24-52-25w4, TD 5,389 ft.; Hanna Petroleums Syndicate 4, LSD 14, 22-32-15w4, TD 4,930 ft.

N. CENTRAL TEXAS

New Strawn Production Is Found Southeast of St. Jo

WICHITA FALLS. — New Strawn sand production was reported at S. D. Johnson and associates 1 Cannon, J. Bradshaw Survey, A-31, 5 miles southeast of St. Jo, in northwest Cooke County.

A 1-hour drill-stem test from 2,750-56 ft. showed gas at the surface in 5 minutes, oil in 25 minutes and recovered 2,750 ft. of clean oil, plus 60 ft. of oil-cut mud.

Operators drilled plug and were testing from 2,750-56 ft. The hole filled with oil and after the swab was run to bottom seven times, it kicked and flowed for 30 minutes. The amount of oil flowed was not reported. Swabbing was resumed and after a few trips the well started flowing again, holding the flow for 2 hours, through ¾-in. choke. Bottom-hole pressure was 1,200 psi. The well was shut in for storage, with no estimate made on its productivity.

The same operators staked location for their 1-A Cannon, 330 ft. from west and 990 ft. from south lines, of the east 80 acres, same survey and abstract, for an east offset test.

Archer County.—Sinclair Oil & Gas Co. 2 W. M. Coleman, Lot 7, Brazos CSL, prospective Strawn discovery 5 miles north of Scotland, drilled sand with oil shows from 4,731-49 ft. A 90-minute drill-stem test of the same interval recovered 600 ft. of gas and 29 ft. of heavily oil and gas-cut mud. Bottom-hole pressure was 315 psi. in 20 minutes.

Operators drilled ahead to 4,769 ft., and a 1-hour drill-stem test to bottom showed gas in 4 minutes and flowing oil in 55 minutes, which emptied the drill pipe after the tool was closed. Recovery in the pipe was 30 ft. of oil-cut mud and 30 ft. of salt water. Casing was to be run for production tests. Location is 2 miles southwest of the Priebe field, which also produces from the Vogtsberger sand, of the upper Strawn.

One mile northwest of Mankins, The Texas Co. 1 J. B. Ferguson, Block 13, McKinney & Williams Survey, was drilling below 5,061 ft., in the Caddo. No tops had been reported. A 2-hour drill-stem test from 4,951-8- ft. recovered 30 ft. of slightly oil and gas-cut mud, and 150 ft. of gas. Drilled to 5,009 ft., another 2-hour test recovered 15 ft. of drilling mud with only a rainbow show of oil.

Jack County. — Mid-Continent Petroleum Corp. 1 T. E. Davis, J. J. Shelton Survey, 12 miles east of Jacksboro near the west Wise County line, was swabbing on perforations in the Ellenburger at 6,705-45 ft. after treating with 500 gal. Total depth was 6,898 ft., plugged back to 6,748 ft.

Mid-Continent staked two locations for wildcat tests in northern Jack County. Its 1 B. Zuber was located 556 ft. from north and 330 ft. from west lines, J. N. Kirkpatrick Survey, and 4 miles southeast of Post Oak. Location is about 2 miles southeast of present Ellenburger production. Contract was to 7,000 ft. Mid-Continent 1 Roy Cherryhomes was located 3,580 ft. from west and 330 ft. from south lines, J. Irvin Survey, 2 miles north of Cundiff and 1 mile due south of an Ellenburger failure.

Knox County.—Stanolind Oil & Gas Co. also made location for its 1 Big Four Ranch Co., in the northwest corner of the county. Location for the 5,500-ft. wildcat is 2,970 ft. north and 990 ft. from west lines of Section 35, Block 4, D&W Survey. Stanolind is reported to hold a block of several thousand acres in the area, extending into Foard County.

Montague County. — Continental Oil Co. extended Caddo lime production to the north of the Richardson field at its 1 W. P. Brigance, Block 82, Titus County School Lands Survey, 7 miles southeast of Bowie. The well flowed 72 bbl. of oil in 2 hours through ¾-in. tubing choke, from perforations at 6,050-72 ft., following a treatment with 3,000 gal. of acid.

Magnolia Petroleum Co. 1 J. Carminati, Block 193, J. H. Belcher Survey, 4½ miles northwest of Montague, was drilling below 4,804 ft. A drill-stem test of Strawn sand from 4,630-39 ft., open 1 hour, recovered 30 ft. of slightly oil-cut mud.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Cooke County: Kimbell-Sims 1 George Anderson, 330 ft. from E. 330 ft. from S lines, Blk. 25, CSL Sur., A-1248, 1 mi. NE Callisburg, TD 3,620 ft., top pay 3,611 ft., IP pumped 115 bbl. 47°-gravity oil a day, GOR 500 cu. ft.

Haskell County: Thomas D. Humphrey 1 T. L. Ballard, 330 ft. from N and E lines, 14-1-H&TC, 5 mi. S Haskell, ex-

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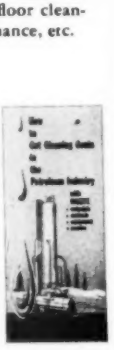

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tension S. Haskell field, TD 3,598 ft., elevation 1,492 ft., top reef lime pay 3,590 ft., IP pumped 39.4 bbl. 37.7°-gravity oil a day, GOR 100 cu. ft.

Jack County: Mid-Continent Petroleum Corp. 1 G. W. Fowler "A," 1,650 ft. from N, 330 ft. from E lines, C. H. Simpson Sur., A-1654, 8 mi. NE Jacksboro, TD 6,571 ft., PB 6,477 ft., top pay 5,342 ft., IP flowed 1,560,000 cu. ft. gas a day, flowing tubing pressure 80 psi., casing 475 psi.

Stephens County: J. E. Vaughn 3 Ross Elliott, 1,226 ft. from S, 330 ft. from W lines, 53-7-T&P, SW corner of county, TD 3,700 ft., elevation 1,431 ft., top pay 3,690 ft., IP flowed 92 bbl. 42°-gravity oil a day, 16/64-in. choke, GOR 400 cu. ft., CP 300 psi., TP 75 psi., Lake sand pay.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Anderson Prichard Oil Corp. 1 Mrs. J. H. Turbeville, Blk. 22, Jefferson CSL, 3 mi. E Anarene, dry, TD 3,790 ft., elevation 1,150 ft., sand with oil show 933 ft.

Archer Drilling Co. et al 1-C Wilson, "C" lease, Jose Ostane Sur., A-333, 3 mi. N Archer City, dry, TD 1,204 ft., elevation 1,015 ft.

Fowler Farm Oil Corp. 1 C. T. W. Mankins, Sec. 2, SPRR Sur., A-944, 2 mi. SE Mankins, dry, TD 657 ft.

Needl & Hood Drilling Co. 3 J. S. Bridwell, Lot 17, Wm. B. Aldridge Sur., 9 mi. N Archer City, dry, TD 1,595 ft., recovered some oil at 1,592 ft.

Clay County: Jack Grace Production Co. 1 Lewis Brown, Blk. 16, Orange CSL Sur., 6 mi. SW Henrietta, dry, TD 6,375 ft., tops not reported.

Jack Grace 2 D. M. Cobb, J. Scott Sur., A-691, 933 ft. W of 1, 7½ mi. NW Shannon, dry, TD 6,245 ft., Ellenburger 6,135 ft.

Fisher County: Stone, Sillars & Ewing 1 Harden-Simmons University, Lot 40, Lge. 313, G. N. Weekly Subdivision, Bastrop CSL, 2½ mi. W Royston, dry, TD 5,010 ft., elevation 1,960 ft., Noodle 2,195 ft., Cook sand 3,215-20 ft.

Haskell County: Pan American Production Co. 1 Ollie Courtney, NE NE 17-2-H&TC, 3½ mi. S Sagerton, dry, TD 5,600 ft., elevation 1,628 ft.

Jack County: J. J. Lynn 1 L. A. Cranford, A. Ferguson Sur., A-215, 3 mi. N Perrin, dry, TD 4,804 ft.

Jones County: Robinson-Puckett, Inc., 1 R. S. Sprayberry, Sec. 16, OAL Sur., 2½ mi. NE Anson, dry, TD 4,067 ft., elevation 1,670 ft.

Montague County: S. D. Johnson 1 A. L. Reed, Blk. 36, J. H. Belcher Sur., 1½ mi. SE Belcherville, dry, TD 5,496 ft.

Shackelford County: Whiffen estate 1 Estelle Flippen, NW NW 41-11-T&P, 5 mi. S Albany, dry, TD 4,624 ft., Caddo 4,116 ft., Marble Falls 4,311 ft., Mississippian 4,591 ft., Ellenburger 4,610 ft.

Stonewall County: Seaboard Oil Co. of Delaware 1 J. D. Smith, NE SE 344-2-H&TC, 11 mi. S Peacock, dry, TD 6,670 ft., elevation 1,946 ft., Canyon reef 5,900 ft., Ellenburger 6,645 ft.

Taylor County: Taubert Drilling Co. 1 M. J. Farr, Sec. 54, James Vaugh Sur., 8 mi. SW Abilene, dry, TD 4,600 ft., elevation 1,841 ft., Dotham sand with oil show 1,808-16 ft., Palo Pinto 3,656 ft., Gardner sand 4,362 ft., Gray sand 4,572-85 ft.

Throckmorton County: Sorrells Oil Co. 1 A. D. Montgomery, Sec. 1616, TE&L Sur., 8 mi. NW Woodson, dry, TD 4,828 ft., elevation 1,336 ft., recovered oil-cut mud in lime at 4,175-94 ft.

Wichita County: L. A. Hedrick 1 Ed Payton, Blk. 318, Waggoner Colony Subd., 6½ mi. NE Electra, dry, TD 2,840 ft.

S. D. Johnson 1 J. D. Avis, Lyman F. Rounds Sur., A-717, 6 mi. SE Wichita Falls, dry, TD 5,614 ft.

Wise County: G. E. Kadane & Sons 1 Daisy Taylor, Sec. 10, Falk CSL, 2 mi. SE Park Springs, dry, TD 6,024 ft.

PERMIAN BASIN

New Pay Established in Northwest Pecos Valley

MIDLAND.—Completion this week was made at Fullerton Oil Co., Callery & Hurt, and Peerless Oil & Gas Co.'s 1-D Kone Production Co., establishing a new pay in the northwest part of the Pecos Valley (Yates sand) in the Ellenburger.

The discovery, which has been testing for the past few weeks, topped the Ellenburger at 7,968 ft., on an elevation of 2,448 ft. Pay was found at 7,971 ft., and the well was drilled to 8,210 ft., then plugged back to 8,157 ft. Flowing through ¾-in. choke, the well gaged 648 bbl. of oil in 24 hours, and on completion potential it gaged 505 bbl. of 43.6°-gravity oil a day, through the same size choke on 2½-in. tubing set at 8,157 ft. Gas-oil ratio was 630 cu. ft.

Location is 4 miles east of the Santa Rosa Ellenburger distillate field, 8 miles southwest of the Abell Ellenburger field, and 10 miles south of Grandfalls.

Tex Harvey Oil Co. was reported to have taken over the Rigo Petroleum Co.'s 1 Monroe, Section 40-1-I&GN Survey, Pecos County wildcat 4 miles north of Sheffield, which was dry at 2,533 ft. in Permian lime. New contract will explore the Ellenburger, to 9,000 ft.

Scurry County.—Standard-Fryer Drilling Co. made official completion at its 1 Edwin S. Wilkirson, link well between the North Snyder and Kelly fields, for a flowing potential of 365 bbl. of oil in 12 hours, through ½-in. choke, from reef pay between 6,601-50 ft., total depth.

Six miles north of Dermott, Progress Petroleum Co. 1 E. S. Carden, SE SE 503-97-H&TC, reported two drill-stem tests. At 6,997-7,007 ft., open 5 hours, gas showed in 30 minutes and recovery was 550 ft. of

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THE OIL AND GAS JOURNAL

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oil and gas-cut mud, and 870 ft. of 41.5 -gravity oil. At 6,997-7,017 ft., a 3-hour test had gas in 3 minutes, and recovered 1,415 ft. of oil, 300 ft. of mud and 180 ft. of salt water. Operators were drilling ahead at 7,040 ft. following the tests.

Northeast of the field, Stanolind Oil & Gas Co. 1-A J. G. Whatley was drilling lime below 7,582 ft., following a 90-minute drill-stem test from 7,550-82 ft. which recovered 120 ft. of mud with no shows.

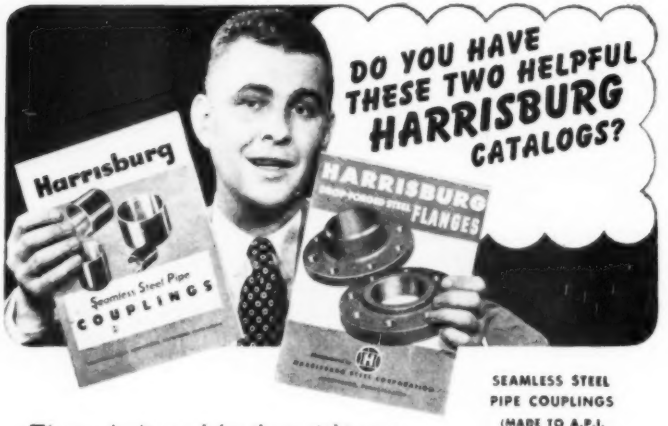
Ray & Harris Drilling Co. 1 Laura B. Smith, NW NW 159-97-H&TC, 15 miles southwest of Snyder, was drilling below 6,000 ft.

S. B. Roberts et al 1 Burl H. Lewis, 246-97-H&TC, 3½ miles northeast of Diamond M, was drilling below 4,760 ft.

Sunray Oil Corp. 1 Sentell, Section 26, J. P. Smith Survey, 2 miles east of North Snyder production, ran a 24-minute drill-stem test at 7,382-7,448 ft., which had gas in 4 minutes, mud in 8 minutes, oil in 15 minutes, and flowed into oils at an estimated rate of 25 bbl. of oil in 9 minutes. It was coming out of the hole at last report.

Completion reports on extension wells in the North Snyder area included Standard of Texas 1 T. C. Davis, 467 ft. from north and east lines of the southeast quarter, 339-97-H&TC, which is a west outpost to the extension area. Initial potential was 1,104 bbl. of oil a day, flowing through ½-in. choke on 2-in. at 6,876 ft. Total depth was 6,891 ft. Top of pay was 6,652 ft., on an elevation of 2,479 ft.

Standard of Texas 1 L. S. Herod, 467 ft. from south and 660 ft. from east lines, west half, 383-97-H&TC, a northwest edge well to the south extension area, flowed 1,540 bbl. of oil a day, through ½-in. choke on 2-in. set at 6,902 ft. Total depth was 6,913 ft., top of pay 6,617 ft., and elevation 2,500 ft.



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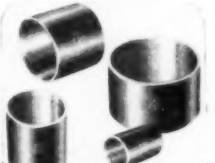

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Humble completed its 2 L. W. Perriman, SE NE 438-97-H&TC, a south offset to its 1 Perriman, for 288 bbl. of oil a day, flowing through ½-in. choke on 2-in. set at 7,009 ft. Total depth was 7,060 ft., top of pay 6,953 ft., and elevation was 2,563 ft. Field reports indicated it was 40 ft. high on the reef pay to the 1 Perriman.

In the Sharon Ridge Canyon field, Thomas W. Doswell, Henry Ford II, and others 2 C. W. Addison, NW NE 122-25-H&TC, had top of pay at 6,670 ft., on an elevation of 2,302 ft. A drill-stem test in the top of reef pay was said to have flowed an estimated 150 bbl. of high-gravity oil an hour. The test was through ⅝-in. choke, flowing into pits.

Mitchell County.—Standard Oil Co. of Texas completed its Canyon lime discovery, 8½ miles south and slightly west of nearest Canyon production in the Sharon Ridge field, for a daily potential of 500 bbl. of 47.5 -gravity oil. The discovery is 1 B. F. Dunn, Section 64, Block 20, Lavaca Navigation Co. Survey. Production was without acid, flowing through ½-in. choke from perforations at 7,565-83 ft. Flowing tubing pressure was 200 psi., and 600 psi. on casing. Gas-oil ratio was 1,280 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Scurry County: Standard-Fryer Drilling Co. 1 Edwin S. Wilkinson, SW SW 17-1-J. P. Smith Sur., between Kelly and North Snyder fields, TD 6,650 ft., elev. 2,375 ft., top reef 6,602 ft., pay 6,601 ft., IPF 365 bbl. 43 -gravity oil in 12 hr., ½-in. choke on 2-in. tubing at 6,640 ft., GOR 966 cu. ft., TP 300 psi., CP 550 psi., completed without acid, no formation water.

Terrell County: Western Natural Gas Co. 1 O. J. Hoge, NW NE 29-161-GC&SF, NE corner of county, TD 5,910 ft., PB 5,440 ft., elev. 2,422 ft., perforated in Permian sand 5,250-5,417 ft., 500 gal. acid, IPF 627,000 cu. ft. of gas daily.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Crockett County: Moore Exploration Co. 1-64-A H. M. Halff estate, approximately NW NE NW 64-1-I&GN, 6 mi. SE Iraan, dry, TD 2,805 ft., elev. 2,173 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Magnolia Petroleum Co. 1 Walker, SW SW 8-9s-36e, 2 miles east of the Bough field, Lea County, ran a 3-hour drill-stem test at 4,800-49 ft., recovering 90 ft. of drilling mud and 360 ft. of sulfur water. Flowing pressure was 230 psi. A second test, open 2 hours, at 4,860-4,907 ft. made approximately the same recovery, with flowing pressure of 400 psi. Third test, from 4,910-52 ft., open 2 hours and 30 minutes, recovered 195 ft. of slightly gas-cut mud with sulfur water, and 300 ft. of slightly gas-cut sulfur water. Flowing pressure was 300 psi. Drilling continued below 4,952 ft.

Gulf Oil Corp. 1 Maud Saunders, SE SW 34-14s-33e, southeast of the Caprock field, was testing with total depth at 9,882 ft. On an elevation of 4,207 ft., top on the Pennsylvanian was reported at 9,586 ft.

A 1-hour drill-stem test from 9,564-98 ft. recovered 600 ft. of water blanket and 45 ft. of drilling mud with no shows. A core from the interval tested showed dolomite, with the bottom 10 in. having pin-point staining.

A core at 9,852-83 ft. recovered 8 ft. of lime, and 23 ft. of fairly porous lime, to porous lime bleeding oil and water. A 2-hour test at 9,800-83 ft. had mud in 21 minutes, gas in 24 and oil in 35 minutes, flowing to pits for 25 minutes. It then flowed 30 bbl. of fluid in 1 hour, of which 5 bbl. was oil and 25 bbl. was salt water.

Atlantic Refining Co. 1 Bettie C. Dickinson, NW NW 13-15s-37e, two locations southeast of the Denon field discovery, topped the Abo section at 8,190 ft., according to one report, which checked some 320 ft. low to the discovery well. A drill-stem test at 8,766-8,830 ft., open 50 minutes, re-

(Continued on page 184)

OHIO, KENTUCKY

South-Central Jackson Township Activity Increases

COLUMBUS.—The south central part of Jackson Township in Knox County promises to be one of the most active areas in the state as nine new locations have already been reported. H. E. Perkins, Preston Oil Co., Allen Willey, and Sheffield Oil Co. are each represented with two wells either located or drilling.

In Union Township, Knox County, Donaldson, Humrichouser et al reached the Clinton on the 1 Neiderhouse, Lot 2, at 3,134 ft. with an open flow of 681,000 cu. ft. of gas natural. In Jefferson Township, Ray Penick et al finished their well on Stitzline, Section 21, at 55 bbl. and 300,000 cu. ft. gas after shot.

Mid East Oil Co. 8 R. E. Beard, Section 32, Madison Township, Perry County, logged the Clinton at 3,160-99 ft. with 200 ft. oil natural and 80 bbl. in 24 hours after shot. The company plans on moving north to the C. O. Melick tract for the next test.

Frank Lyons et al have a rig on location for a wildcat Clinton test on H. Yeager in Section 36, Union Township, Carroll County. The location is about 15 miles east of the Sandyville field.

OHIO WILDCAT FAILURE

Cuyahoga County, Mayfield Township: Benedum-Trees 1 Meri Eichenberg, Lot 20, St. Peter 5,690-92 ft., dry, TD 5,823 ft.

WESTERN KENTUCKY

OWENSBORO.—Two miles northeast of production in the Sturgis pool, southern Union County, and just east of the Sturgis townsite, Ike McNabb found saturation in the McClosky lime in his 1 Union County Airport, 13-M-19, and has cemented casing on the zone preparatory to testing. Pay is at 2,291-3,303 ft. and looks like a new discovery.

What appears to be either a half-mile northward extension of the Griffiths pool, or possibly a new separate producing area, in Daviess County, is in prospect at Rama Sweet 1 Towery, NE SE SE 9-P-28. The well encountered favorable showings both in Palestine sand at 977-98 ft., and in Waltersburg sand at 1,106-21 ft. Oil string (5½-in.) has been cemented on top the Waltersburg at 1,108 ft.

In the same section at the north end of the field, Roy Pledger has established a new pay zone, the O'Hara lime, for the area. With casing perforated in this zone at 1,804-13 ft., the well has been completed pumping 42 bbl. daily. Pay was acidized with 4,000 gal. Total depth is 1,857 ft. with 5½-in. casing at 1,851 ft.

Carter Oil Co. 13 Culver heirs, deep exploratory test in the Hitesville pool, has been plugged back to the Cypress sand pay zone of the pool where casing has been perforated at 2,225-35 ft., and testing is under way. Hole was carried to a total depth of 4,812 ft. in Devonian. Before testing the Cypress, casing (cemented at 2,666 ft.) was perforated in McClosky lime at 2,576-80 ft. but no commercial production was indicated at that level. Present plug-back depth is 2,250 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: George S. Engle 1 Crutchfield, NW NE NW NW 13-Q-22, dry, TD 2,656 ft.

C. E. Skiles 1 Hagerman, SW NW SW SW 4-Q-20, dry, TD 1,955 ft.

EASTERN KENTUCKY

ASHLAND.—In Morgan County, 4-P-76, Earl McClure et al 1 Lize Vance had top of Weir sand at 1,085 ft. with show of oil and gas. Berea was found at 1,236 ft. with a showing of oil, and drilling continued to the Corniferous lime, topped at 1,615 ft. with oil and gas shows to total depth of 1,870 ft. After shot Corniferous gas was gaged at 350,000 cu. ft. per day and operators continue testing. Well is located on northeast extension of the old Cannel City pool.

In the Big Sandy Gas field of eastern Kentucky recent completions by the Kentucky-West Virginia Gas Co. are as follows: in Floyd County 909 Eastern Gas & Fuel Association made 61,000 cu. ft. daily from Devonian black shale at total depth of 3,685 ft.; 5890 Daniel Johnson in same county made 119,000 cu. ft. daily from the black shale at total depth of 3,685 ft.; in Pike County 5874 J. J. Kendrick made a total of 152,000 cu. ft. daily from the Big Lime, Berea, and black shale; and in same county 5907 George Priest made 1,356,000 cu. ft. daily from the Maxon sand at total depth of 1,728 ft.

INDIANA

EVANSVILLE.—Placed on the pump, George & Wrather Drilling Co. and J. W. Havens 1 Henry Titzer, SE NE SW 17-3-10w, rank wildcat in southern Gibson County, is making approximately 50 bbl. of oil daily while testing Tar Springs sand at 1,543-52 ft. Prior to pumping tests, it swabbed at the rate of 90 bbl. daily with pay zone shot with 30 qt. of nitro.

The discovery, located 5 miles from any other production, is a mile east of Fort Branch and about 18 miles north of Evansville. Nearest production is in the Barret-Mitchell pool, 6 miles northeast of Fort Branch.

A new producing area about a mile south of the St. Wendells South pool and about 4 miles south of the town of St. Wendell in Posey County, appears to have been found by C. E. Skiles in his 1 Luigs-Helfert-Schauss, SE SE NW 25-5s-12w, where cable tools are being moved in to drill plug and test Cypress sand at 2,280-86 ft. In a drill-stem test of this zone, the well

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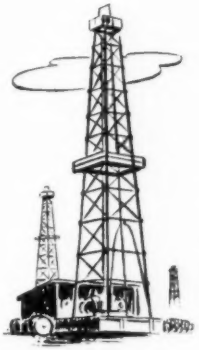

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made a recovery of 50 ft. of free oil and 60 ft. of oil-cut mud after the testing tool had been open 60 minutes. There was no indication of water.

The recently opened Patoka East pool in Gibson County has been extended a little more than a half mile south by C. E. Robb at his 1 Hardiman, NE NE SW 32-1s-10w, which pumped 28 bbl. of net oil per day at completion with the pool's Cypress sand pay at 1,733-48 ft. Water production was estimated around 200 bbl. daily with hole plugged back from a total depth of 1,984 ft. The pool now has four producers.

INDIANA WILDCAT FAILURES

Daviess County: Morgan Coal Co. 1 Hacker, NE NE SW 6-3n-7w, dry, TD 2,782 ft.

Gibson County: F. L. Beard 1 McClellan, NW SW NE 23-2s-13w, dry, TD 2,003 ft. Clarence Wood 1 Davis et al, SW NE NW 34-3s-12w dry, TD 2,576 ft.

Pike County: Ryan & Sharp 1 McLaughlin, NW NE NE 31-1s-6w, dry, TD 2,619 ft.

Sullivan County: Kingwood Oil Co. 1 Hickory Grove Coal Co., NW NE NW 27-8n-8w, dry, TD 2,318 ft.

ILLINOIS

Second New Producing Area Opened Near Louden Field

MATTOON.—The second new producing area to be opened east of the Louden pool in Fayette County, within the past month has been proven by Reynolds & Henson at their 1 Kuppels, SE SE SE 35-8n-3e, which has been completed pumping 55 bbl. of oil daily without acidization or shooting. Production is from Cypress sand at 1,601-12 ft.

The discovery is about 1½ miles southwest of the new Louden extension area opened late in September by W. L. Beldon 1 Grames, SW NE NW 25-8n-3e, completed as a 130-bbl. pumper in the same pay at 1,492-1,512 ft. Confirmation of the latter discovery also has just been made by the same operator at his 1-A Hudson, a southwest diagonal offset, completed the past week pumping 125 bbl. daily with Cypress at 1,541-60 ft.

In the meantime, an east offset to Reynolds & Henson well has been found unproductive. It is 1 Clow, SW SW SW 36-8n-3e, drilled through the Cypress to a total depth of 1,764 ft.

Haynes Drilling Co. and F. R. Stocker 2 John Schafer, NW SE NW 15-1n-12w, first McClosky lime producer in the Allendale area, Wabash County, pumped 67 bbl. daily at completion. Pay is at 2,344-60 ft. with bottom of the hole at 2,365 ft. Other production in the area is from the Bethel sand and Rosiclare lime horizons.

Productive limits of the recently opened and active Raccoon Lake pool, 4 miles northeast of Centralia, in Marion County, were expanded the past week in all three of the pool's present pay zones. The three new wells increased to 12 the number of producers in the pool, opened last July. Cypress production was extended a diagonal location southwestward by E. M. Self 1 Trout Comm., NW SE SW 3-1n-1e, pumping 35 bbl. daily at 1,666-74 ft. The Texas Co. 3 Langenfeld, NE NW SE 3-1n-1e, was completed as a 257-bbl. pumper in the Aux Vases at a plug-back depth of 1,878 ft., extending this pay a location northward. The Texas Co. 1 Griner, SE SW NE 3-1n-1e, a location north of 3 Langenfeld and most northerly well of the pool, was completed as a 46-bbl. pumper in McClosky lime at 1,917 ft.

ILLINOIS SUCCESSFUL WILDCAT

Fayette County: Reynolds & Hinson 1 Kuppel, SE SE SE 35-8n-3e, IP 88 bbl., Cypress 1,602-12 ft., TD 1,612 ft. (Extension Louden pool).

ILLINOIS WILDCAT FAILURES

Bond County: C. S. Beck 1 Goestenkors SW SW SE 30-5n-4w, dry, TD 2,148 ft.

Christian County: J. W. Milloneus 1 Ellison, NW NE NW 22-13n-1e, dry, TD 2,348 ft.

Clark County: National Consumers Oil Co. 1 Brosman, NE NW NW 21-11n-12w, dry, TD 2,425 ft.

Clay County: F. J. Fleming 1 Stanley et al, NE SE SW 6-4n-8e, dry, TD 3,040 ft. J. W. Rudy 1 Slagley, NE SE NW 18-3n-5e, dry, TD 2,875 ft.

Coles County: Ernest Zink 1 Whalen, SW NE NW 9-12n-14w, dry, TD 580 ft.

Edgar County: Caro Oil & Gas Co. 1 Thill, NE SE NE 6-13n-13w, dry, TD 535 ft.

Hamilton County: Stewart Oil Co. 1 Cross, SE SW SW 19-6s-6e, dry, TD 3,345 ft.

Lawrence County: S. J. Slagter 1 Baltzell, NW NE SE 8-4n-13w, dry, TD 2,526 ft.

Madison County: Dale Hopkins 1 Klaus, NW SE SW 36-5n-5w, dry, TD 2,067 ft. W. O. Laswell 1 Pierron, NW SE NE 10-4n-5w, dry, TD 578 ft.

McCoupin County: R. A. Sloan 1 Consolidated Coal Co., SW SE SW 20-7n-6w, dry, TD 1,713 ft.

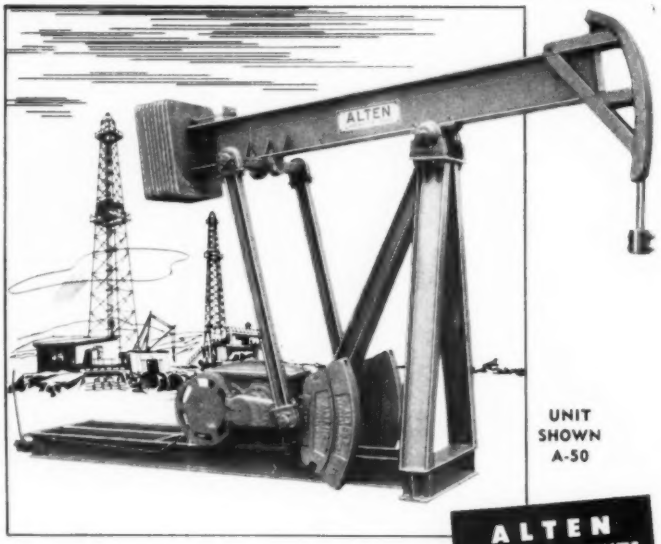
Perry County: A. Thornton 1 Thornton, NE SW NE 5-4s-4w, dry, TD 470 ft.

Saline County: George S. Engle 1 Sempson, NW NW NE 17-8s-7e, dry, TD 1,303 ft. C. E. Skiles 1 Barnes, NW NW SE 25-7s-7e, dry, TD 3,100 ft.

Washington County: Harrison & Smith 1-A Finke, SE SE SW 8-3s-4w, dry, TD 2,482 ft.

Wayne County: N. C. Davis 1 Heidinger, SW SW NW 20-1s-9e, dry, TD 3,304 ft. W. O. Lucas 1 Thompson, SE NE SW 12-1n-5e, dry, TD 3,133 ft. Robinson & Puckett 1 Baker, NE NE NE 21-2s-8e, dry, TD 3,420 ft.

White County: George & Wrather and Aurora Gasoline Co. 1 Keck, SW NW NW 31-6s-11e, dry, TD 3,060 ft. C. E. Skiles 1-A Pearce, SE SE NE 2-7s-10e, dry, TD 2,853 ft.



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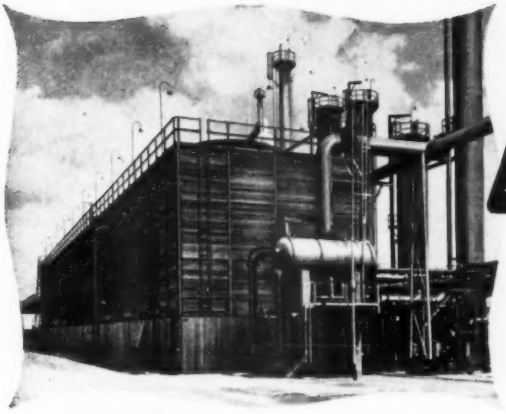

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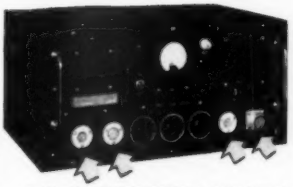

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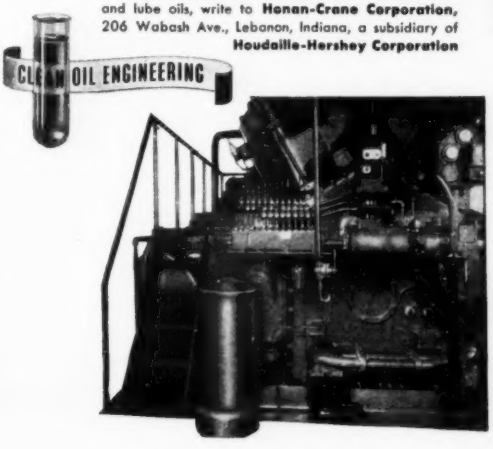
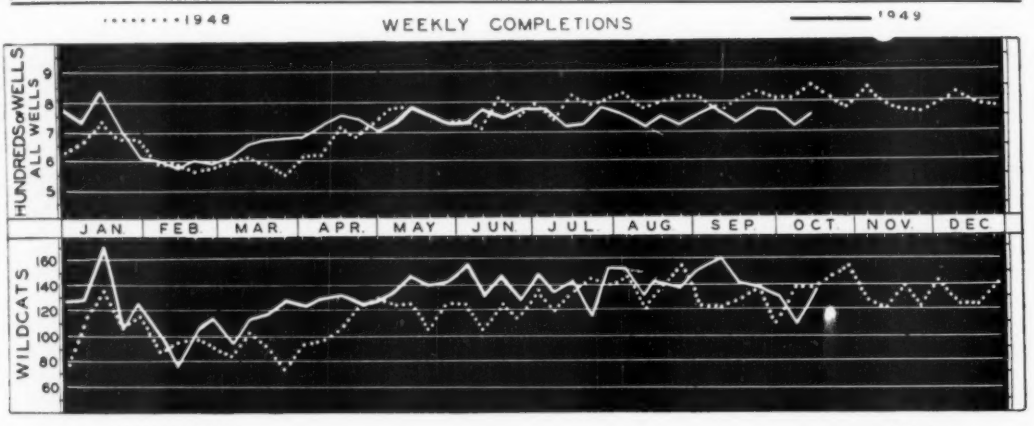
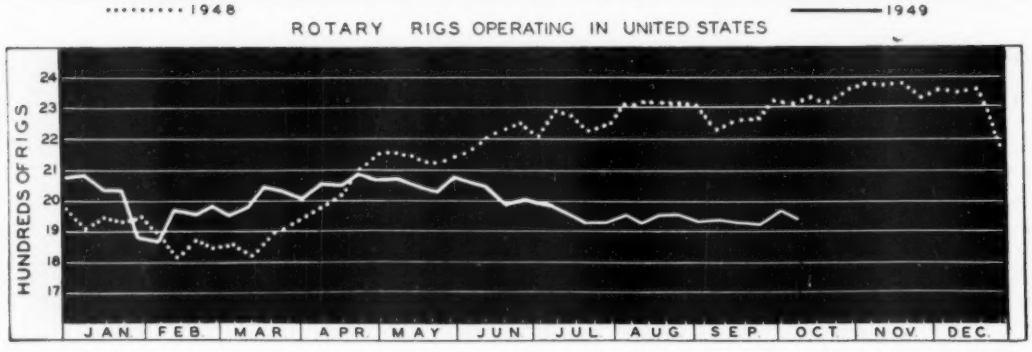


WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 15, 1949

	Total of all wells					Oct. 15		Wildcat completions and discoveries					Cumulative total, 1949				
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	13	6	0	[7]	15,041	622	1,097	0	0	0	0	0	0	0	0	0	0
Pennsylvania	30	10	6	[14]	52,198	1,555	2,430	0	0	0	0	0	0	0	4	1	5
West Virginia	7	1	4	2	16,574	383	681	0	0	0	0	0	1	0	11	9	21
Ohio	24	6	11	[7]	55,604	842	1,080	0	0	0	1	1	1	0	2	26	29
Indiana	30	8	3	19	57,837	1,017	823	0	0	0	5	5	27	0	2	186	215
Kentucky	25	9	4	12	46,009	753	714	0	0	0	2	2	23	0	0	61	84
Illinois	75	30	1	[44]	171,721	2,106	1,871	1	0	0	21	22	53	0	1	358	412
Michigan	18	10	0	8	34,163	787	640	1	0	0	6	7	23	0	3	243	269
Kansas	51	21	10	[20]	160,416	2,519	2,485	2	0	0	4	6	61	0	7	321	389
Neb., Mo., Iowa	1	1	0	0	4,425	20	54	1	0	0	0	1	2	0	0	14	16
Oklahoma	70	39	5	[26]	214,640	3,335	3,284	4	0	0	9	13	110	12	15	481	618
Texas	262	166	13	83	1,126,900	10,306	9,453	10	0	3	43	56	324	40	98	1,785	2,247
North Central (Dist. 7-B & 9)	80	37	1	42	247,813	3,441	2,939	3	0	1	18	22	151	0	18	709	878
West (Dist. 7-C & 8)	60	54	1	5	275,127	2,484	2,557	1	0	1	1	3	45	1	5	200	251
Panhandle (Dist. 10)	21	14	5	2	62,495	759	515	0	0	0	0	0	1	0	1	9	11
Eastern (Dist. 5, 6, & 6-P)	22	18	1	3	114,317	607	459	2	0	0	2	4	10	4	3	121	138
Gulf Coast (Dist. 2 & 3)	40	23	3	14	259,987	1,510	1,485	2	0	1	11	14	64	28	40	303	435
Southwest (Dist. 1 & 4)	39	20	2	17	167,161	1,505	1,498	2	0	0	11	13	53	7	31	443	534
Louisiana	54	39	5	10	287,640	1,786	1,861	0	1	0	3	4	46	17	4	164	231
Northern	32	19	5	8	105,028	1,063	1,268	0	0	0	3	3	4	2	0	78	84
Southern	22	20	0	2	182,612	723	593	0	1	0	0	1	42	15	4	86	147
Arkansas	7	4	0	3	23,670	252	234	0	0	0	1	1	3	0	1	56	60
Mississippi	7	4	0	3	47,753	266	329	1	0	0	1	2	5	1	1	80	87
Southeastern States	0	0	0	0	0	39	38	0	0	0	0	0	1	0	0	33	34
Montana	15	8	3	4	36,937	236	245	0	0	0	2	2	4	0	2	26	32
Wyoming	8	4	0	4	48,950	459	414	0	0	0	2	2	22	0	0	89	111
Colorado-Utah	2	1	0	1	8,131	113	177	0	0	0	1	1	2	0	0	52	54
Dakotas	7	0	3	4	10,863	15	2	0	0	0	4	4	0	0	0	12	12
New Mexico	10	7	1	2	49,567	396	475	1	0	0	1	2	12	1	2	42	57
California	45	31	0	14	177,042	2,075	2,259	0	0	0	7	7	32	0	6	361	399
Total United States	761	405	69	287	2,646,081	29,882	30,656	21	1	3	113	138	752	71	159	4,400	5,382
Total previous week	716	415	74	227	2,377,035			18	3	4	89	114	731	70	156‡	4,287	5,244
Total October 16, 1948	855	493	82	280	3,092,060			19	2	7	111	139	693	60	204	3,923	4,880

Service wells included: [7], [12], [1]. ‡Revised.





DAILY AVERAGE PRODUCTION FOR WEEK

	Oct. 15 crude oil	B. of M. Oct. demand	Oct. 8 crude oil
Alabama	1,300	1,200	1,300
Arkansas	72,650	84,000	72,200
California	890,400	900,000	892,100
Colorado	63,400	70,000	64,400
Eastern	59,200	60,000	62,300
Florida	850	1,100	975
Illinois	179,200	180,000	185,400
Indiana	28,700	28,000	27,500
Kansas	272,250	302,000	249,600
Kentucky	22,800	22,000	23,600
Louisiana	528,975	526,000	528,425
North Louisiana	117,700		117,150
South Louisiana	411,275		411,275
Michigan	44,350	45,000	43,150
Mississippi	101,100	108,000	91,150
Montana	26,500	25,000	26,700
Nebraska	800	700	800
New Mexico	126,900	134,000	126,900
Oklahoma	416,400	410,000	413,800
Texas	2,026,200	2,190,000	2,026,200
Dist. 1 (Southwest)	27,375		27,375
Dist. 2 (Southwest)	125,300		125,300
Dist. 4 (Southwest)	193,875		193,875
Dist. 3 (Gulf Coast)	379,100		379,100
Dist. 5 (Eastern)	35,225		35,225
Dist. 6 (Eastern)	86,200		86,200
East Texas field	251,700		251,700
Dist. 7-C (West)	51,625		51,625
Dist. 8 (West)	581,325		581,325
Dist. 7-B (W. Central)	63,100		63,100
Dist. 9 (N. Central)	139,275		139,275
Dist. 10 (Panhandle)	92,100		92,100
Utah	3,250	1,000	2,900
Wyoming	128,200	122,000	128,100
Total United States	[1]4,993,425	5,210,000	4,967,500
Change from previous week, up	25,925		
Canada	65,140		70,035

Total U. S. production January 1-October 15 [1]1,458,121,445 bbl.
Same period last year (crude plus cond.) 1,585,278,285 bbl.

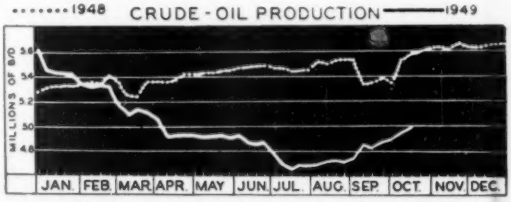
[1]Not incl. 79,320 bbl. condensate. [2]Incl. 23,787,810 bbl. condensate.

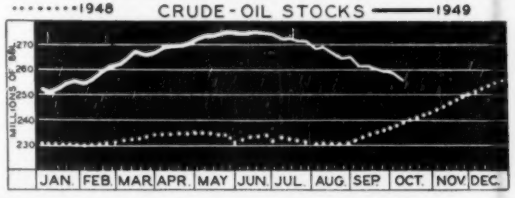
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

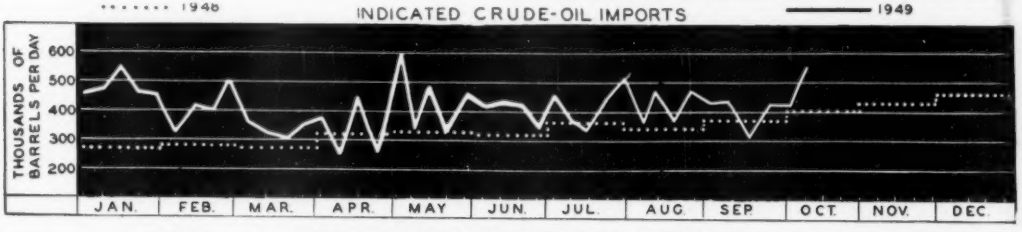
(Thousands of barrels)

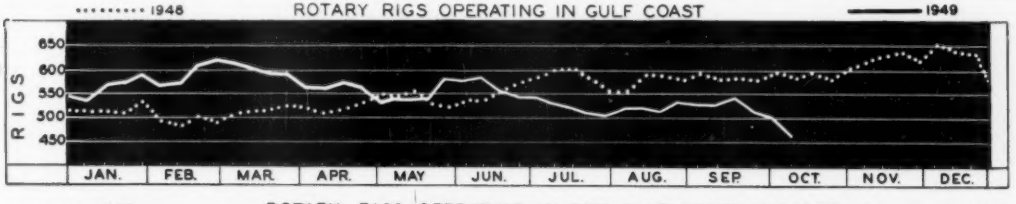
	Oct. 8, 1949	Oct. 1, 1949	Oct. 9, 1948
Pennsylvania Grade	3,296	3,191	2,851
Other Appalachian	1,949	1,922	1,262
Illinois, Indiana, Michigan	12,072	12,027	11,231
Arkansas	2,684	2,782	3,158
Louisiana	12,933	13,768	12,133
North	3,363	3,455	2,546
Gulf	9,570	10,313	9,587
Mississippi	2,566	2,623	2,675
New Mexico	7,260	7,349	5,959
Oklahoma and Kansas	38,490	39,302	34,811
Texas	116,795	118,558	111,476
East Texas	16,702	17,140	16,700
West Texas	44,662	46,517	42,508
Texas Gulf	28,777	28,944	28,228
Other Texas	26,654	25,957	24,040
Rocky Mountain	13,998	13,910	9,788
California	36,342	[2]36,027	25,628
Foreign	7,600	6,841	5,224
Total United States	255,985	[2]258,300	226,202

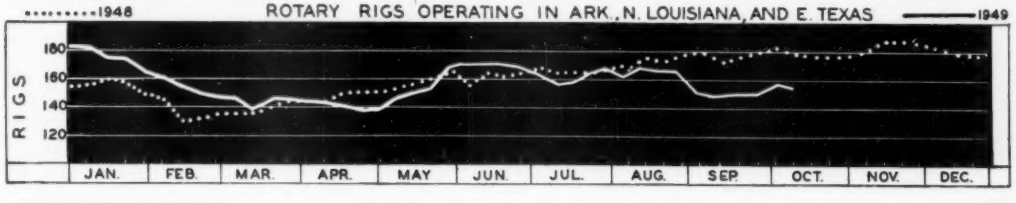
*Bureau of Mines. [2]Revised.











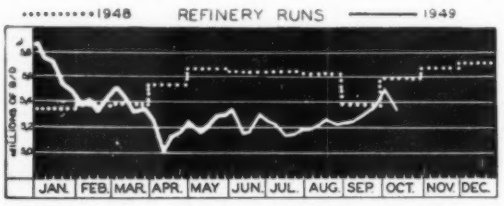
Refining Statistics

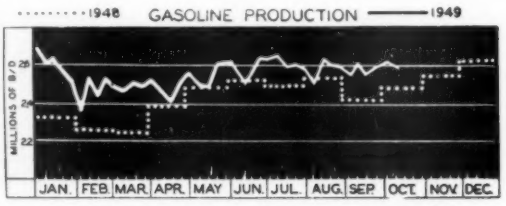
A.P.I. REFINERY REPORT, OCTOBER 8

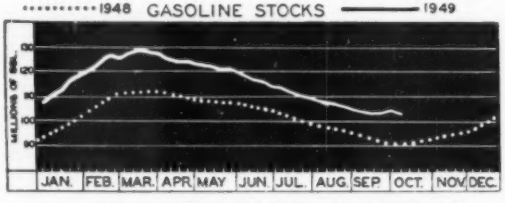
(Thousands of barrels)

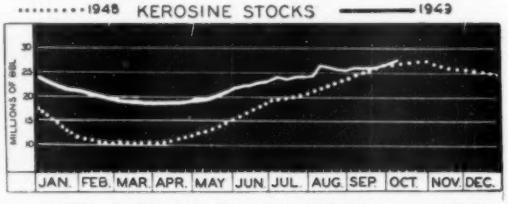
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, October 1948				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production			
											Gasoline*	Kerosine	Distillate	Residual
East Coast	796	348.6	38.4	176.7	195.3	22,883	11,686	27,189	9,963	900	328.0	46.1	194.1	226.0
Appalachian:														
District 1	93	47.9	5.4	11.0	10.0	2,550	401	859	424	99	40.6	6.9	13.1	13.8
District 2	69	37.3	4.1	7.4	12.9	1,134	145	204	93	60	28.2	2.4	6.6	12.2
Ind., Ill., Ky.	954	512.4	57.3	142.3	116.1	22,183	5,505	13,303	3,705	948	479.9	55.7	136.9	159.8
Okla., Kans., Mo.	452	252.3	25.3	80.0	63.0	9,048	1,674	6,225	1,867	440	239.5	22.6	89.0	75.1
Inland Texas	190	135.1	8.9	20.1	44.7	3,601	931	970	1,502	229	152.2	11.8	24.4	59.7
Texas Gulf Coast	1,266	577.8	92.1	259.4	216.3	14,454	3,345	14,734	7,342	1,408	619.7	96.0	325.9	251.0
La. Gulf Coast	475	222.6	56.3	114.9	58.1	5,672	2,220	4,509	2,465	452	182.6	46.4	100.5	74.1
N. La. and Ark.	77	31.1	8.0	9.6	17.1	2,495	520	826	364	82	31.7	9.0	12.1	17.9
Rocky Mountain:														
New Mexico	12	6.4		1.9	2.9	76	50	96	31	13	7.1	0.5	1.9	3.7
Other Rocky Mtn.	158	77.3	4.1	32.1	32.4	2,532	403	2,132	620	150	70.7	3.7	27.5	33.6
California	793	337.9	12.9	163.3	283.0	16,079	668	14,753	39,846	861	310.0	10.6	122.7	336.7
October 8, 1949	5,335	2,586.7	312.8	1,018.7	1,051.8	102,707	27,548	85,800	68,222	5,642	2,490.2	311.7	1,054.7	1,263.6
October 1, 1949	5,493	2,625.9	258.8	994.6	1,073.4	103,895	27,196	83,495	67,955					
October 9, 1948	5,598	2,435.0	345.0	1,018.7	1,252.9	91,411	26,946	73,713	58,997					

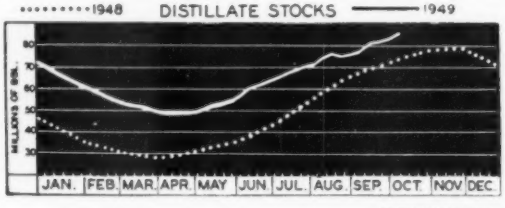
*At refineries including natural blended. †Finished and unfinished.

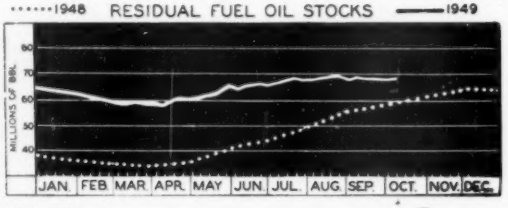


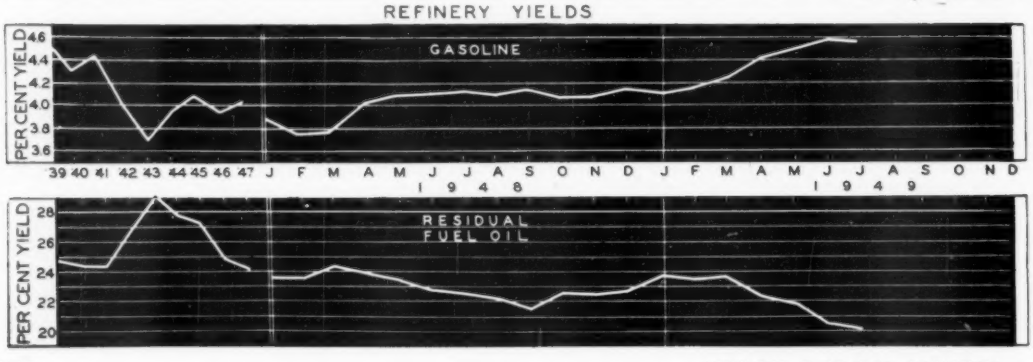











REFINERY YIELDS
GASOLINE
PER CENT YIELD
39 40 41 42 43 44 45 46 47 J F M A M J J A S O N D J F M A M J J A S O N D
1948
1949
RESIDUAL FUEL OIL
PER CENT YIELD

CRUDE PRICES GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.53	...	...	...
19-19.9	1.63	...	...	...
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.40
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

RESIDUAL fuel oil prices are at about the three-quarter mark in another price-increase cycle. When East Coast supplies are ample, there are unconfirmed reports of sales at a discount. As demand increases, these reports disappear and are replaced by rumors of higher bidding on the Gulf Coast. The result is an increase in Gulf Coast quotations followed by gains for the East Coast.

Esso Standard Oil Co. announced a new price for Bunker C at Gulf Coast ports effective October 15. The current price of $1.65 per barrel represents an increase of 15 cents over previous quotations established September 10. Other suppliers reported increased movement of heavy fuel from the Gulf at better prices. Since there is a fairly constant transportation differential between Gulf and East Coast prices, increases are expected in New York Harbor quotations.

Warm weather in the northeastern part of the country has resulted in what has been described as a "temporary softening" of the distillate fuel market.

At the beginning of the winter season primary suppliers of home-heating fuels must plan stocks and incoming supplies on a basis of colder-than-normal weather. Record heating-oil demands are forecast for this winter and supplies for the East Coast have been scheduled to meet these demands. East Coast distillate stocks are at an all-time high as shipments from the Gulf Coast continue while movement to the consumer is slow because of the very warm weather. A change in the weather will bring a firmer market.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of October 17, 1949. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	9⅝-10	11.125-11.5	9½-10
Premium gasoline, 78-80 octane	10⅜-11	12.5	10½-11
42-44 w.w. kerosine	7¾-8¼	8.9	7¾-8¼
No. 2 straw fuel oil	6¾-7	8.2-8.5	7-7¼ *
No. 6 residual	$0.95-1.00	$1.90	$1.50-1.70

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5⅞	5⅜	5⅝
Grade 18-55	7.1	6.5	6.8

LUBRICATING OILS
SOUTH TEXAS

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS
Mid-Continent

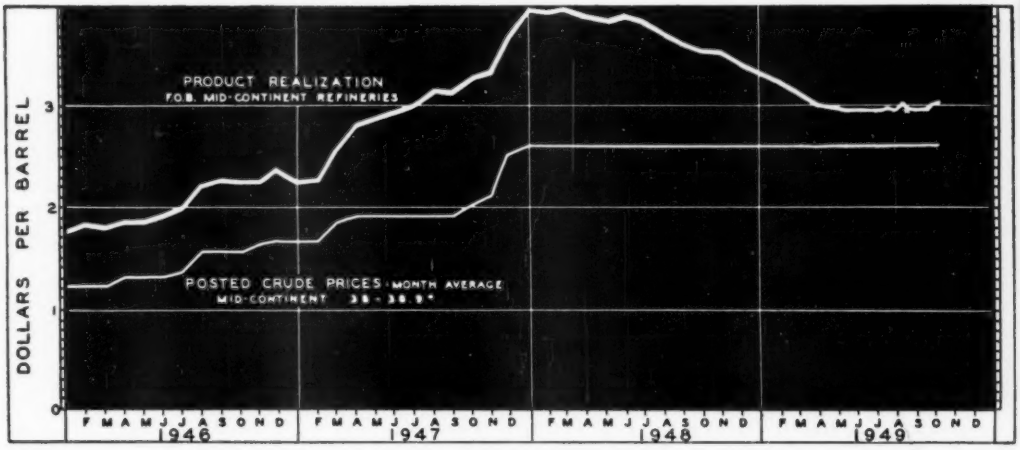
150-160 vis., D bright stock, 0-10 pp.	17-19
200 vis., No. 3 neutral, 0-10 pp.	11.5-14

Western Pennsylvania

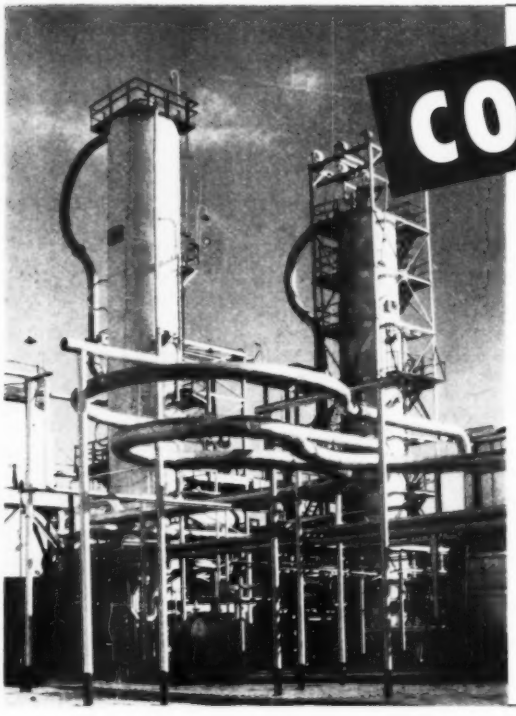
145-155 vis., 10 p.t. bright stock	19.5-20
180 vis., 0 p.t. neutral	20.5-21

WAX
Mid-Continent

132-134 A.M.P.	4.25



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil



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SCALE AND CORROSION

In Cooling Towers, Compressors
Engine Jackets—Wherever Water Is Used

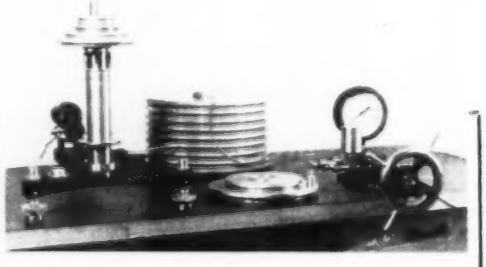
Wright Chemicals are specifically formulated for individual applications in the Petroleum Industry to protect equipment from scale and corrosion.

There is a Wright Field Engineer near you who will be glad to help you with your water-conditioning problems. No obligation.

Wright CHEMICALS

WRIGHT CHEMICAL CORPORATION
Specializing in Water Conditioning
GENERAL OFFICE AND LABORATORY
615 West Lake Street, Chicago 6, Illinois
OFFICES IN PRINCIPAL CITIES
Sole Distributor of Nelson Chemical Proportioning Pumps

No. 6 of a series of photographs of new scientific equipment



LABORATORY DEAD WEIGHT GAGE—10,000 psi or 750 kg/cm²
.05% Accuracy

INSTRUMENTS for the Oil Industry

Ruska Instrument Corporation specializes in the development and manufacture of scientific instruments for the oil and mining industries.

- CORE ANALYSIS INSTRUMENTS
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- REFINERY RESEARCH
- HIGH PRESSURE LABORATORY EQUIPMENT
- GEOMAGNETIC INSTRUMENTS

Ruska Instrument Corporation
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Place your message before the largest audience in the Oil Industry for as little as $3.

Mail your CLASSIFIED AD today for NEXT WEEK'S issue of the Journal—Deadline 9:00 a.m., Monday morning.

(Further details in the Classified Section.)

EQUIPMENT MEN ... in the News

Smith Joins Brown & Root As Sales Engineer

E. C. SMITH

Addition of Earl C. Smith to the staff of Brown & Root, Inc., as sales engineer has been announced by George R. Brown, executive vice president. Smith, a graduate chemical engineer from Iowa State College, goes to Houston from New York where for several years he was job and design engineer for Lummus Co.

His past experience includes service as engineer with M. W. Kellogg Co., New York, where he did the engineering on structural changes in refinery designs; as sales engineer with Gulf Oil Corp.; test engineer with Maritime Petroleum Corp. and Richfield Oil Corp; assistant superintendent and engineer with Anderson-Prichard Oil Corp.; and operating engineer with Shell Oil Co.

C. W. Thornhill on Visit To European Oil Fields

C. W. Thornhill, vice president of Thornhill-Craver Co., Houston, is making a 2-month business trip covering the European oil industry. Thornhill and his wife sailed from New York on October 14 for Europe and are scheduled to return sailing on December 3 from England on the Queen Elizabeth.

Digel Heads Pur-O-San Sales Office in Tulsa

Pur-O-San Co., Bradford, Pa., manufacturers of chemical corrosion inhibitors for water, has opened an office in the McBirney Building in Tulsa. Jim Digel, sales representative in charge of the Tulsa office, was transferred to Tulsa from the home office in Bradford.

Digel is well qualified to serve the petroleum industry in the Mid-Continent area, being well acquainted with the industry in Pennsylvania.

Magnolia Airco Opens Oxygen Plant at Hobbs

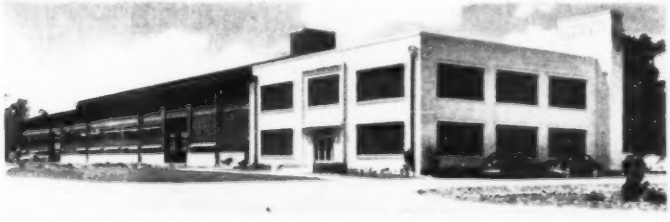
Magnolia Airco Gas Products has opened a new oxygen plant in Hobbs, N. M., according to J. F. Pryor, president. The announcement disclosed that the new plant will also serve as an acetylene warehouse point. The plant superintendent is William Bowhay.

Link-Belt Manufacturing Plant Opened in Houston

Link-Belt Co., manufacturer of chains, elevators, conveyors, and power-transmitting machinery, has announced opening of a new manufacturing plant in Houston.

The plant, comprising approximately 45,000 sq. ft. of floor space, includes a one-story all-steel factory building with three bays, and a two-story office section. The plant proper consists of a machine shop, structural-steel shop, and large warehousing facilities.

Allen Craig, formerly located at the Link-Belt plant in Atlanta, is general manager of the company's Southwestern division, with headquarters at the new Houston plant.



New Link-Belt plant recently opened at Houston will enable the company to give its customers in Texas, Oklahoma, Arkansas, and Louisiana more direct service

Rogers and Ray Travel to Africa and Middle East

Sam D. Rogers, Rogers-Ray, Inc., Houston, recently flew to the Ogaden in Ethiopia for a 6-week trip to supervise seismograph exploration work

S. D. ROGERS

R. H. RAY

for Sinclair Prairie Oil Co. A magnetometer party will also engage in work in this area. This is the first exploration work undertaken in Ethiopia.

Robert H. Ray, also a principal in Rogers-Ray, Inc., is on the way to Saudi Arabia and Iraq to supervise gravity-meter and exploration activity for Aramco and Iraq Petroleum Co., Ltd.

On the return trip Rogers will meet Ray in Cairo and return through Europe together. They will come back by way of Paris, London, and The Hague.

Twist Named Manager of F.M.C. Peerless Pump

G. F. TWIST

Food Machinery & Chemical Corp. has announced the appointment of Gerald F. Twist as manager of the firm's Peerless Pump Division with headquarters at Los Angeles. Twist took over the duties of Francis F. Fairman, Jr., who is resuming his former association with General Electric Co.

Following his graduation from Stanford University, school of mechanical engineering, Twist became associated with F.M.C.'s Anderson-Barngrover Division. Shortly thereafter he accepted a position in the experimental department of Atlas Imperial Diesel Engine Co., at Oakland, Calif., and eventually became a director and executive vice president of Atlas.

(Continued on page 183)

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

EQUIPMENT FOR SALE

FOR SALE: McKissick Tubing and Floor Blocks. Save 50%. Melton Supply Co., Seminole, Okla.

FOR SALE

One Wilson Giant Hydromatic rig complete with 129' L. C. Moore derrick and 6000' 4½ drill pipe. Rig capable of drilling 8000'. Completely equipped, in excellent condition and ready to drill.

One Wilson Atlas Rig complete with 129' L. C. Moore derrick and 6000' drill pipe, 4½. Rig capable of drilling 9000'. Completely equipped, in excellent condition and ready to drill.

Priced for immediate delivery, subject to prior sale at $65,000.00 each.

JOE FOWLER
1009 City Nat'l Bldg. Phones 2-5401-2-3
Wichita Falls, Texas

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Two Fairbanks-Morse Diesel Engines, 150 H.P. Twin Cylinder, Horizontal Type. Completely overhauled. $1500.00 each. Melton Supply Co., Seminole, Okla.

FOR SALE: Skid mounted double drum spudder, 7000 foot capacity, complete. Box D-223, The Oil and Gas Journal, Tulsa, Oklahoma

FOR SALE: D-13000 Caterpillar Diesel Engine, $2,500.00 F-23 O.C.S. Jackshaft Clutch $600.00; C. O. Jones, Box 510, ElDorado, Kansas.

FOR SALE: Cardwell Model "RL" Spudder complete, Waukesha Motor, almost new lines, steel roof and floor, side curtains, new doghouse, two complete strings of tools, Koehler light plant, 1250 gal. Butane tank—now on location near Grayville, Illinois. Geo. H. Wickham, Box 595, Phone 149, Grayville, Illinois.

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

NEW FRACTIONATING TOWER REFLUX DRUM

One (1) New fractionating tower, 5'-0" I.D. X 89'-6" over-all height X 1⅛" plate. Thirty-four (34) bubble trays, ten (10) 18"-300# manways. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

One (1) new horizontal reflux drum, 5'-6" I.D. x 18'-6" over-all length x 1¼" plate. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

ROCK ISLAND OIL & REFINING CO., INC.
335 West Lewis St. Wichita, Kansas
Phone 7-3325

EQUIPMENT FOR SALE

New Wire Rope at Money-Saving Values: Leading brands. Sizes ¼" to 1⅛". 6x19, 6x37, construction for all purposes. Degen Pipe & Supply Company, Box 107, Red Fork Station, Tulsa, Oklahoma.

FOR SALE: Reboiler, Jackson Engineering, size 16-35-75, tube pressure 175 lbs., temperature 380° F. Model #1, Heater #265 Excellent condition. Box 610, Mt. Pleasant, Texas.

CORE Drilling & Shot Hole Rigs; Longyear, Sullivan, Franks. New and used equipment, ready for service. PK rods, N rods, B rods, bits, Spudders and cable tools. Everything for well drilling. We save you money. Pressey & Son, Pueblo, Colo.

FOR SALE: Cardwell Rotary Rig, complete with Mast. Suitable for 3,500 ft. drilling. Bargain. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE: Two like new 74,000 bbl. cap. tanks. Low price. at Morgantown, W. Va. 2 new 10,000 bbl. bolted at N.Y. Darien Corp., 60 E. 42nd St., N. Y., N. Y.

NEW 6⅝" O.D. API LINE PIPE

73 miles new 6⅝" O.D. 13# API Electric Weld Line Pipe.

ROCK ISLAND OIL & REFINING CO., INC.
501 KFH Building, Wichita, Kansas

PACKAGED H_2S REMOVAL UNITS

We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.

GRAFF ENGINEERING & EQ'PT. CO
3415 Westminster, Dallas 5, Texas

COMBINED VAPOR SEPARATOR & FRACTIONATOR FOR THERMAL REFORMING

One (1) New 5'-6" ID x 61'-0" over-all height Bubble Tower made of 1¼" Plate and lined throughout with 5/64" and 7/64" thick, 11-13% Chrome stainless steel, type 405. Stainless steel support plates in place for 15 Trays, (Trays not included). Constructed in accordance with the API-ASME Code, stress relieved and radiographed. Designed for 400 PSI @ 750° F. Fabricated by A. O. Smith Corporation. Platform and ladder clips installed.

WOOD RIVER OIL & REFINING CO., INC.
335 West Lewis Street, Wichita, Kansas
Telephone 7-3325

FOR SALE

120,000'—6⅝" OD, 17.65#, seamless, range 3, beveled
50,000'—4½" OD, 8.65#, seamless, range 3, beveled
60,000'—6⅝" OD, 19.79#, lapweld, T&C.

Ready for immediate delivery. A-1 every respect, priced to sell. Location, Tulsa, Oklahoma.

W. C. BERRY
Box 1858 Tulsa, Oklahoma Phone: 3-6141

LIQUIDATION SALE—3,000' CAPACITY ROTARY RIG

If you need a low price rig for shallow drilling, it will pay you to see this one.

Wichtex type drawworks unit with 140-GKU Waukesha engine; 10³¾" x 64' high A-mast; 7¼ x 14 pump with JL-1335 Buda engine; 4½" drill pipe, blocks, hook, swivel, rotary and accessory equipment. Located Butler County, Kansas.

LUCEY PRODUCTS CORPORATION
624 S. Cheyenne TULSA, OKLA. Phone: LD 204

For Sale
OIL HEATER

Foster Wheeler oil or gas fired oil heater with a capacity of 10,000 lbs. per hour, with 300° F. temperature increase — Complete with controls—Unit has been used less than 100 hours.

Any reasonable offer will be accepted.

THE BEST FOODS, INC.
701 Belleview Dallas, Texas

EQUIPMENT FOR SALE

FOR SALE: Failing "1500" portable rig for shot-hole, core, water-well, and shallow production drilling. Equipped with sand reel and bailer. Mounted on GMC truck. Rig and Truck in excellent condition. Rider & Montgomery, Box 523, Douglas, Wyoming.

FOR SALE: Mayhew Shot Hole Drilling Rig mounted on 1947 Ford truck. 550 gallon water tank mounted on 1947 Ford truck. Complete with all equipment, in good condition, ready to move on job. Priced to sell. F. W. Brown, Box 607 or Phone 400, Britton, Oklahoma.

FOR SALE: 1—Pipe pulling outfit complete with Caterpillar tractor, and Cardwell single drum winch, with spudder attachment, 48′ wood-A-Mast and all tools. Price $3500.00; 1—Extra Pipe pulling pole mounted on dual wheel rubber-48′-long-5-sheave Western Iron crown. Price $1000.00; 1—Converted Star spudder, #26 Caterpillar 30—Tractor powered—Tools, but no lines. Price $1750.00: L. B. Finney, Box 455, Madison, Kansas.

FOR SALE: Foxboro, Westcott and Emco Orifice Meters with Piping, Mercury and Leveling Saddles. Also Davis and Chaplin-Fulton Regulators. George R. Milner, Okmulgee, Oklahoma.

FOR SALE: R L Spudder completely equipped. NEW 5000′—9/16″ sand line and NEW 5500′—⅞″ drilling line. Unit in exceptionally good working condition. Write Box 647, Great Bend, Kansas.

FOR SALE: Demonstrators and used E.L.I. portable rotary drills. One M6-WD with 37 ft. mast mounted on KB6 International. (4,000 mi.) Looks like new. F.O.B. plant—$9,500. One M6-WD with 27 ft. mast mounted on KB6 International. (8,100 mi.) Looks like new. F.O.B. plant—$9,000. One M6-D mounted on F6 Ford 1948. New drill guaranteed. $9497.87 F.O.B. plant. One M-5 Shot hole drill on 1947 Ford. (16,500 mi.) F.O.B. plant—$3,500. One M-5 Shot hole drill, skid mounted—$3,000. One flat bed water truck, 650 gal. Vacuum lift, winch and A-Frame on 1948 F6 Ford—$3,950. Two 350 gallon water tanks sq. type with winch and A-Frame on 1947 Fords. F.O.B. plant $1250 each. Your inquiry solicited. See your local dealer or call, wire or write—Engineering Laboratories, Inc., Tulsa, Oklahoma, or Garland, Texas.

150 HP. Murray Water Tube Boiler complete with burner, forced draft fan with motor, and automatic controls. Good condition. Boiler now in service. Neuhoff Bros. Packers, Dallas, Texas.

LINE PIPE

Subject to prior sale we offer 200 miles used 10″ lapweld 40 lb. line pipe, plain end, bevel 30° for weld, located in Missouri. This pipe is part of 435-mile line replaced by the 22″ Ozark pipe line system and was operating at 780 lb. pressure when taken out of service. Dismantling and reconditioning of this pipe is now in progress and available for inspection. Price $1.65 per foot, F.O.B. Missouri shipping points.

Left over from construction of Ozark system, we offer 15,000 ft. new 22″ 79 lb. P.E. and E.W. line pipe, located near St. Louis, Missouri.

SHELL PIPE LINE CORPORATION
Care of J. B. Thompson, P.O. Box 2648
Houston, Texas Phone LD-855

FOR SALE

NEW ½″ to 2″ incl. GALVANIZED PIPE

Used Pipe:

2½″ Standard Black Line Pipe, P.E.
4″ Standard Black Line Pipe, P.E. or T&C
5½″ O.D. 13# & 17# Casing
6⅝″ O.D. 13# Casing
7″ O.D. 17# & 20# Casing
8⅝″ O.D. 17# & 24# Casing

BANKOFF PIPE & SUPPLY COMPANY
823 North Lewis Phone 6-2119
TULSA, OKLAHOMA

EQUIPMENT FOR SALE

4—10½″ x 24″ COMPRESSOR Cylinders with Pistons and Rods for 225 H.P. Miller Gas Engine Driven Compressor. Kentucky West Virginia Gas Co., Second National Bank Building, Ashland, Kentucky.

FOR SALE: 12,500 ft. 10¾″ OD 28# used line pipe single random lengths. Close out sacrifice price. Commercial Metals Co., P.O. Box 1046, Dallas, Texas.

FOR SALE: At East Chicago, Ind., 1 New Hendrix Tape TS 1 ½ Yard Dragline Bucket. Complete. Serial #5773. $750.00. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: Truck-mounted 30 HP Bettis Steamer, complete with water tank, fuel tank, tools. Suitable for steam cleaning, oil treating. Dave Edmiston, Russell, Kansas.

TRUCKS WITH FRONT WHEEL DRIVE

2 auto car tractors, 10 tons, new 1942, 5000 miles, $1450 each, 2 GMC 2½ ton, new 1943, 4,000 miles, $1250 each, 1 Chevrolet, 1½ ton, new 1942, 4000 miles, cab over engine, large rack body, $850. All trucks guaranteed, terms arranged. Eveready Supply Co., 805 Housatonic Ave., Bridgeport, Conn.

DIESEL ENGINE FOR PIPE LINE

225 HP Busch Sulzer Model 3DF17, 360 RPM, 175 HP at 300 RPM, 3 cyl., 4 cycle, solid injection. Complete, late model. Excellent shape. $3200 f.o.b. St. Louis.

MISSISSIPPI VALLEY EQUIPMENT CO.
511 Locust St., St. Louis 1, Mo.

EQUIPMENT FOR SALE

FOR SALE: Failing Model 1500 Heavy Duty Rotary drilling rig, equipped with 4½″ x 6″ mud pump, mounted on 1948 International KB6 truck, complete with drill pipe, subs, tools, etc. Also 800 gallon custom built water tank, equipped with vacuum lift, mounted on 1948 International KB6 truck. All equipment in excellent condition. Address: Box D-168, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: At Houston, approximately 22 miles 6″, 12.98# PE Beveled Republic Electricweld #1 Used Line Pipe. Double Length. 86 cents per foot. Cities Service Oil Co. Patridge, Bartlesville, Okla.

FOR SALE: In West Texas, Model 61 Wichita Spudder, complete with 150 H.P., LeRoi Drilling Engine, all tools, dog house, light plant, and Shear Pole Mast. Rig is mounted on 12″ I Beam Skids. Box D-228, The Oil and Gas Journal, Tulsa, Oklahoma.

404 CORE BARREL—Drills faster, takes larger core, runs in 6¼ inch casing. Makes 2⅞ inch core. Prices quoted on request. Mfg by East Side Machine Works, 17 S. Ashby, Chanute, Kansas.

Several Army Surplus 4½″ x 6″ Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86084—Houston, Texas

FOR SALE

5—35,000 bbl. steel tanks, riveted, 5′ x 10′ steel sheets, 6 rings high, complete shell, bottom, angles and ladder, cut down, rivets backed out, approximate weight 90 tons each. Price $3,000.00 each, gradesite, Stoy, Illinois

W. C. BERRY
Box 1858 Tulsa, Oklahoma Phone: 3-6141

GLASS PLANT LIQUIDATION

GAS ENGINE GENERATORS — BOILERS — LIFT TRUCKS, ETC.

Dismantlement of large glass plant in Pittsburgh district makes available—Bruce McBeth Natural Gas Engine driving 230 V. D.C. Generators, 75 KW and 150 KW. Motor Generator Set 75 KW, 230 V. D.C., Battery (Edison A8) Lift Trucks and 36″ gauge Locomotives, Lehrs, Glass Tanks, Ash Disposal Units, Boilers, Gas Producers, C.I. and Diamond Floor Plates, Electric and Steam Pumps, Blowers, Motors, etc.

HETZ CONSTRUCTION CO.
Warren, MC 37, Ohio Ph. Niles, Ohio, 2-2509

Immediate Delivery—Sacrifice

TWO GAS ENGINE DRIVEN GENERATORS

480 Volts, 3 Phase, 60 Cycle, 80 PF
Each 293 KVA

All New Equipment, Westinghouse Generators, Ingersoll-Rand Gas Engines, General Electric Switch Gear. Complete with Accessories.

INVOICE PRICE $72,000.00
PRICE $50,000 F.O.B. Odessa, Texas

For Full Information Contact
W. M. Bisett—Tel. 2-3173

SID RICHARDSON CARBON CO.
Fort Worth, Texas

EQUIPMENT FOR SALE

ASKANIA Vertical Magnetometer. Good condition; rectangular case; Temperature compensated; Sensitivity-25 c.g.s. $800.00. Box D-242, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: National Rotary Rig mounted on 1942 Chevrolet Truck, complete with 650 ft. drill stem, two core barrels, six drag bits, also other parts. Price $2500.00. Wesley C. Young, Box 3294, Sonora, Texas.

EQUIPMENT WANTED

WANTED: Fort Worth Jumbo "D" spudder. Preferably without tools or engine. Quote price, year, condition, and location. G. W. Hicks, Box 125, Moline, Kansas.

WANTED: One 7¼ X 10 Mud Pump, One Oil Bath Rotary Table. Must be in No. 1 condition. Quote price. Boge Iron & Metal Co., Inc., Wichita, Kansas. Phone L. D. 79.

HELP WANTED

ENGINEER or thoroughly experienced oil man wanted capable of doing market research work in both drilling and refining division of oil business. Excellent future. Box D-232, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED ELECTRICAL ENGINEER

with refinery experience to take charge of steam and electrical generating plant, instrumentation and all utilities in large Mid-Continent independent refinery.

When replying give education and experience, background.

Box D-241

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

REFINERY ENGINEERS

An American oil company operating in South America has openings for qualified graduate engineers:

EQUIPMENT INSPECTORS

Mechanical Engineers with 3-6 years in refinery with substantial equipment inspection experience. Will arrange and conduct inspections, request equipment renewals due to corrosion, failure or defectiveness in conformance with accepted safety codes. Will conduct tests of equipment, study causes and prevention of corrosion and failure of metals.

STAFF ENGINEERS

Electrical and Mechanical Engineers with 3-5 years oil refinery experience. Must be familiar with design and construction of oil refinery process equipment, electric power plants and related projects. Field experience necessary.

Write us telling of your age, marital status, education and detailed experience resume. Your letter will be held strictly confidential.

Box 308-R

Radio City Station

New York 19, N. Y.

PROPERTY ACCOUNTANT

WANTED FOR OVERSEAS

By Long Established Oil Co.

The property accountant would be required to take physical inventories of producing and pipe line plant and equipment with a very minimum of assistance from the engineers. He would also prepare and or adjust accounting plant and equipment records in accordance with the physical inventories taken. It is, therefore, essential that the candidate not only be experienced in property accounting procedures but also familiar with physical plant and equipment to assure accurate classification.

Salary Open—Age Under 35 Yrs. Preferred.
Write Particulars, Resume of Experience.

Mail Box D-245, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

WANTED: Rotary Driller for Water Well work in East. Write salary expected and qualifications. Reply to Box D-240, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW foreign and domestic Oil Employment Directory. Over 500 listings in drilling, production, refining, natural gasoline pipe lines, geological, exploration, supplies manufacturers, services; and trucking, refinery and pipe line contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla (Our 28th year).

GEOLOGIST, with four or more years active experience in North Louisiana and able to qualify as district geologist. Headquarters in Shreveport. Prefer man under 35. State salary desired. Replies held in confidence. Box D-231, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

Service station maintenance man familiar with all details of construction of stations and bulk plants and who can handle men. Large independent. Year around work. Write in detail about experience, ability, salary desired, etc. Box D-233, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

MECHANICAL ENGINEER: Registered Professional Oklahoma . . . Tulsa resident . . . 30 years old . . . eight years basic supervisory, and executive experience. Desires to invest in and assume portion of responsibility in manufacturing or selling organization. Box D-236, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER with 15 years experience desires position as production superintendent or assistant in small or medium sized plant. Engineering and production experience in heavy chemical, petroleum and petro-chemical industries. Available on 30-day notice. Box D-239, The Oil and Gas Journal, Tulsa, Oklahoma.

CANADIAN Chartered Accountant, 25, proven ability, top accounting degree, 7 years public accounting experience in Canada and U. S. Desires position with oil company with possibility of locating in Canada. Box D-230, The Oil and Gas Journal, Tulsa, Oklahoma.

WIDELY experienced in land and geophysical work with majors and independents in Rocky Mountain and Gulf Coast territories, man with family wishes connection with active company. Excellent background and references. Box D-243, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, MS., 15 years (5 with majors) broad field and office experience including Valuation Reports for financing and sale of oil properties, desires new connection. Now employed. P.O. Box 609, Oklahoma City, Oklahoma.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

LEASE AND DRILLING BLOCKS

S. E. NEW MEXICO OIL

OIL OPERATORS & INVESTORS: Our unbiased recommendations & reports are of value to those interested in the important potential & producing oil field of this state. Details on request gratis to responsible inquiries.

W. J. Peterman Geologist
Portales, New Mexico

LEASE AND DRILLING BLOCKS

FOR SALE: A real bargain in 100 acres, New 10 year Oil and Gas Lease, Shelby County, Texas, surrounded by major companies, 1½ miles from production, priced at $5 per acre. Box 451, Center, Texas.

LEASES ROYALTIES

Producing and Nonproducing

Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6376 Clayton Road, St. Louis 17, Mo.

NORTH DAKOTA MINERALS

Bought direct for you from landowner on your purchase order. I am thoroughly familiar with this play. Wire, call or write

JOHN ALLEN

Suite 200, Grand Pacific Hotel
Bismarck, North Dakota

(Member National Oil Scouts and Landmen Association. References exchanged.)

IN EXCHANGE

For interest in oil leases to be produced, we will furnish brand new oil well casing, tubing and line pipe. Advise full details of the lease or leases you contemplate producing.

Box D-226

The Oil and Gas Journal, Tulsa, Okla.

LEASE AND DRILLING BLOCKS

HAVE twelve hundred acre block solid, open for drilling deal. By owner. Semi-Wildcat Central Texas. Box 551, Breckenridge, Texas.

WILL BUY gas or oil production, large or small. Prefer properties with some undeveloped acreage. Might consider drilling deals. Box D-172, The Oil and Gas Journal Tulsa, Okla.

WILL SELL ⅛ interest undivided or checkerboard 10,000 acres of leases and drill 4 wells. Four separate structures Northwest Colorado and Southern Wyoming adjoining major oil company holdings. Two structures proven for shallow gas. One structure within four miles of production and near recent Oak Creek, Colorado, wildcat discovery. Major oil company will join in drilling. Other structure near 2nd largest oil field in Colorado. Price $10.00 per acre —$100,000.00. S. Marvin James, K-bar-T Ranch, Meeker, Colorado. Phone Meeker 4.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington New Mexico.

BUSINESS OPPORTUNITIES

ATTENTION UTILITIES

Now organizing to furnish gas service to various communities. We will supply **BRAND NEW STEEL PIPE and TUBING** for stock in your company. Give us full details proposed distribution system and financial setup.

Box D-225

The Oil and Gas Journal, Tulsa, Okla.

SERVICES

SERVICES

We wish to thank the oil and gas industry for sympathetic understanding of the effort of GAS NEWS to write the day-by-day story of the advance of natural gas transportation. It is one of the most thrilling "westerns" that ever will be told. GAS NEWS has tried to get the raw facts, make the sources apparent, but leave forecasts to the genius building this great epic. By remaining independent, GAS NEWS can do a better job, unhampered by bias or obligation. In the decade I have written Washington news, no group of individuals has been more stimulating, more helpful, more interesting than the men who make gas go.

Sincerely,

Salley Alley

GAS NEWS

503-18 St., N.W.
Washington, D.C.

EQUIPMENT MEN

(Continued from page 179)

Taussig Made Gas Engineer For Koppers Co., Inc.

J. Hawley Taussig, Jr., former assistant designer of works for the Philadelphia Gas Works Co., has been named gas engineer for Koppers Co., Inc., Joseph Becker, vice president and general manager of Koppers Engineering and Construction Division, has announced.

Taussig will be located in Koppers' New York City sales office where he will work with W. Reed Morris, former vice president and general manager of Koppers Gas and Coke Division and the company's eastern representative, who was named Koppers' consultant to the gas industry following his retirement from active management in 1949.

Mayes Bros. Entertains Pipeliners at Barbecue

Mayes Bros., Inc., held its annual barbecue for pipe liners at its plant in Houston, coincidental with coating and wrapping of its 212 millionth foot of pipe. Mayes Bros. is one of the oldest conditioners of line pipe in the industry and maintains both permanent and portable yards for the protection of new line pipe before it goes in the ground and of old pipe unearthed for renewing.

The company is operated by H. Boyd Mayes, who entered the industry 25 years ago with Humble Pipe Line Co. He established his pipe-line service company in Houston in 1927.

Pipe liners enjoy annual barbecue at Mayes Bros. plant in Houston

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Permian Basin

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covered drilling mud with no shows. Drilling continued below 9,080 ft.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: McAlester Fuel Co. 1 J. M. Denton, SW SE 11-15s-37e, 10 mi. N and 3 mi. W Amerada 1 Hamilton, discovery of Denton field, Devonian pay, TD 11,467 ft., elev. 3,799 ft., top pay 11,325 ft., IPF 456.57 bbl. 44°-grav. oil a day, 12/64-in. choke, 2-in. tubing set at 11,360 ft., GOR 1,465 cu. ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Eddy County: I. W. Bosworth 1 Carper-Bosworth, SE SW 8-21s-31e, dry, TD 4,505 ft., elev. 3,407 ft., base salt 2,562 ft., top Delaware lime 3,938 ft., sand 3,960 ft.

CALENDAR

October

Oil Progress Week, October 16-22.

American Institute of Mining and Metallurgical Engineers, Petroleum Branch, fall meeting, Elk's Club, Los Angeles, October 20-21.

Western Petroleum Refiners Association regional technical meeting on waste-disposal problems, Palmer House, Chicago, October 21.

American Institute of Chemical Engineers, South Texas Section, annual meeting, Hotel Galvez, Galveston, October 21.

National Safety Congress, Morrison Hotel, Chicago, October 24-28.

South Texas Geological Society, sixteenth annual meeting and field trip, San Antonio, October 28-30.

Independent Natural Gas Association of America, annual meeting, Baker Hotel, Dallas, October 31.

November

Pacific Industrial Conferences and Pacific Chemical Exposition, Civic Auditorium, San Francisco, November 1-5.

Society of Automotive Engineers: diesel-engine meeting, Chase Hotel, St. Louis, November 1-2; fuels and lubricants meeting Chase Hotel, St. Louis, November 3-4.

American Petroleum Institute, annual meeting, Stevens Hotel, Chicago, November 7-10.

Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver, November 17-19.

American Association of Petroleum Geologists, Society of Exploration Geophysicists and Society of Economic Paleontologists and Mineralogists, Pacific Coast joint regional meeting, Ambassador Hotel, Los Angeles, November 17-18.

Petroleum Electric Power Association, annual conference, Hotel Beaumont, Beaumont, Tex., November 17-18.

Society of Exploration Geophysicists, regional exploration meeting, Adolphus Hotel, Dallas, November 17-18.

Exposition of Chemical Industries, Grand Central Palace, New York, November 20-December 3.

American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York, November 27-December 2.

West-Central Texas Oil and Gas Association, annual membership and technical meeting, Abilene, November 29.

Mid-Continent Oil and Gas Association, Kansas-Oklahoma Division, annual meeting, Tulsa Building, Tulsa, November 29.

December

American Institute of Chemical Engineers, annual meeting, William Penn Hotel, Pittsburgh, Pa., December 4-7.

Interstate Oil Compact Commission, annual meeting, Roosevelt Hotel, New Orleans, December 5-7.

American Chemical Society, southwest regional meeting, Oklahoma City, December 8-10.

NOMADS

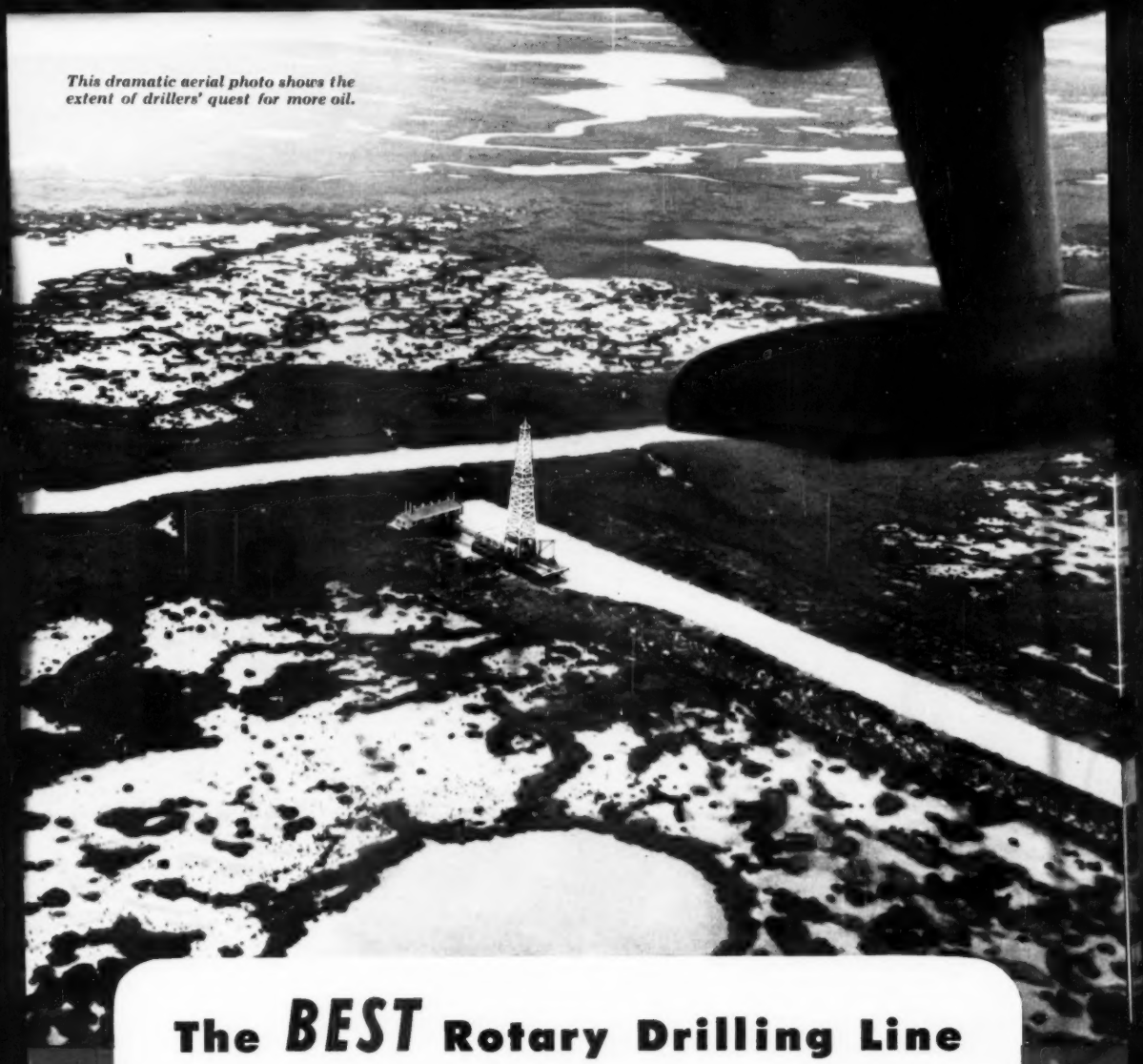
Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas Nomads, first Monday of each month, Texas Room, Baker Hotel.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, business meeting, Louis Sherry's Restaurant, November 21; annual Christmas party, Biltmore Hotel, December 3.



This dramatic aerial photo shows the extent of drillers' quest for more oil.

The *BEST* Rotary Drilling Line is TRU-LAY *Preformed* in

6 x 19 Seale Construction with Improved Plow Steel Wires and Independent Wire Rope Core

Ask your American Cable distributor for it—Say ***TRU-LAY!***

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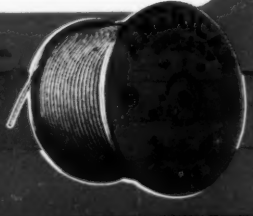

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- Hughes Flash-Weld Tool Joints are built to last the life of your drill stem.
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